

NATIONAL TRANSPORTATION SAFETY BOARD ACCIDENT FILE CONTENTS		PAGE <u>  </u> / OF <u>  </u> / PAGES		
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IDENTIFICATION OF ACCIDENT    Eastern Air Lines Boeing 727-225, N819EA Mt. Illimani Near La Paz, Bolivia January 1, 1985				
ITEM NO.	DESCRIPTION OF ITEM	NO. OF PAGES		
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# PRELIMINARY REPORT

(Preliminary information only, pending completion of the Accident Investigation)

Distribution  
(as appropriate)

State of Registry (or State of Occurrence)  
State of Manufacture  
State(s) having provided information  
ICAO

## COMPILING INSTRUCTIONS

**General** Part I of the ADREP Manual contains all the information needed to complete this form. The report will be submitted in one of the working languages of ICAO. All codes shall be entered in capitals as should the plain language entries. It is highly desirable that all entries be typewritten.

**Identifiers** These cross-refer to the relevant classifications in Part I of the Manual.

**Entries** Enter only one letter or one figure in each square.

**Standard Entries** Entry blocks with a star ★ shall be completed in all cases.

**Diamond Symbol** This symbol shows how to enter letters or figures in an entry block.

**Examples** For ▶ enter thus 

1	0	7
---	---	---

 For ◀ enter thus 

1	0	7
---	---	---

 For ◆ enter thus 

1	0	7
---	---	---

**Entry of figures and letters**

For 0 (Zero) enter thus	0	For A enter thus	A
* For 1 (One) enter thus	1	For AE enter thus	AE
* For 7 (Seven) enter thus	7	For O or Q enter thus	OE
* For U enter thus		UE	

\* For U and Q written entries only.

IDENTIFIER	
XX 01	UNST ◆ STATE SUBMITTING THE REPORT
XX 03	▶ STATE FILE NUMBER
XX 04	180185 ◆ DATE REPORT SUBMITTED
XX 05	85 ◆ YEAR OF OCCURRENCE
XX 06	▶ ICAO FILE NUMBER
XX 07	◆ TYPE OF INFORMATION
XX 08	◆ REQUEST FOR PR
XX 09	◆ REQUEST FOR DR

To be completed by ICAO

IDENTIFIER	
•	AIRCRAFT MANUFACTURER
00 01	148 ◆ In plain language BOEING COMMERCIAL AIRPLANE COMPANY
•	AIRCRAFT MODEL
00 02	11 ◆ In plain language BOEING 727-225B
•	CLASSIFICATION OF AIRCRAFT
06 03	A ◆ In plain language AIRPLANE
•	AIRCRAFT WEIGHT CATEGORY
06 04	4 ◆ In plain language 270001 - 272000 kg
•	STATE OF REGISTRY
00 04	UNST ◆ In plain language UNITED STATES
•	AIRCRAFT REGISTRATION
00 03	N819EA ◆ N
•	NAME OF AIRCRAFT OPERATOR Remaining letters
06 02	EASTERN AIRLINES
•	DATE OF OCCURRENCE (Local)
00 05	01/01/85 ◆
•	TIME OF OCCURRENCE (Local time using 24-hour clock)
00 06	2046 ◆

IDENTIFIER		P-2	
07 03	★	LIGHT CONDITIONS AT SITE OF OCCURRENCE In plain language: NIGHT (DARK)	
00 07	★	LOCATION OF THE OCCURRENCE (Local spelling using Roman letters) N ILLIMANI MOUNTAIN	
00 08	★	LATITUDE Deg Min N/S 16 39 5	
00 09	★	LONGITUDE Deg Min E/W 067 47 W	
00 10	★	STATE OR AREA OF OCCURRENCE In plain language: BOLIVIA	
01 06	★	LAST DEPARTURE POINT (Local spelling using Roman letters) SZ ASUNCION PARAGUAY	
01 07	★	POINT OF INTENDED LANDING (Local spelling using Roman letters) SZ LA PAZ BOLIVIA	
01 01	★	TYPE OF OPERATION - GENERAL AVIATION OPERATIONS In plain language:	CODE ONLY ONE TYPE
01 02	★	TYPE OF OPERATION - AIRLINE OPERATIONS In plain language: B SCHEDULED INTERNATIONAL PASSENGER	
01 10	★	PHASE OF OPERATION - FIRST In plain language: D2 DESCENDING FROM CRUISING LEVEL	
01 11	★	TYPE OF OCCURRENCE - FIRST In plain language: M3 COLLISION MOUNTAIN, CONTROLLED	
01 12	★	PHASE OF OPERATION - SECOND In plain language:	
01 13	★	TYPE OF OCCURRENCE - SECOND In plain language:	
03 01	★	DAMAGE TO AIRCRAFT In plain language: D DESTROYED	
02 01	★	FATAL INDEX In plain language: F FATAL	
02 00	★	NUMBER OF INJURIES TO PERSONS Fatal Serious Minor None Unknown TOTAL CREW TOTAL 08 08	
02 10	★	PASSENGERS 021 021	
02 11	★	TOTAL ABOARD 029 029	
02 12	★	OTHER (IN OTHER AIRCRAFT)	
02 13	★	OTHER (ON GROUND)	

## NARRATIVE

This shall not exceed 200 words and will be presented in the following order:

1. Brief description of the occurrence including emergency circumstances and significant information.
  2. Additional remarks, including precise information on items which have been coded "OTHER".
  3. Safety recommendations and corrective action taken or under consideration.
- Note: Please use the common abbreviations shown overleaf (Page P-4).*

Eastern Airlines flight 980 is a regularly scheduled international passenger flight from Asuncion, Paraguay, to Miami, Florida, with stops in La Paz, Bolivia, Arica, Chile (fuel only), and Guayaquil, Ecuador. Flight 980 departed Asuncion about 1840 A.s.t. on January 1, 1985 with 21 passengers, 3 flightcrew and 5 flight attendants on board. It was on an Instrument Flight Rules VLF/Omega flight plan. The VLF/Omega waypoints coincided with the VOR stations and intersections on airway UA320 between Asuncion and La Paz.

The crew reported passing the Sucre, Bolivia, VOR at 2015 at flight level 350 and estimated their time at DAKON intersection, 55 nautical miles southeast of La Paz, would be 2037. They then requested lower altitude and were cleared to descend to flight level 250 and were asked to report passing DAKON intersection.

When the flight crew reported passing DAKON, the La Paz controller issued a clearance to flight level 180, which was acknowledged by the crew. This was the last contact with the flight.

The wreckage of the airplane, a Boeing 727-225, was located the following day by air search. It was located on the eastern slope of Mount Illimani at an elevation of 19,600 feet. It was on the 106° radial of the La Paz VOR at 26 nautical miles DME. Airway UA320 uses the La Paz 134° radial.



ABBREVIATIONS COMMONLY USED IN THE REPORTS

A/C	:	AIRCRAFT	M	:	METRE
AGL	:	ABOVE GROUND LEVEL	MB	:	MILLIBAR
APP	:	APPROACH	MG	:	MILLIGRAMME
CAT	:	CATEGORY	MI	:	STATUTE MILE
DEG	:	DEGREE (Angle)	MIN	:	MINUTE
DEM	:	DEMOCRATIC	ML	:	MILLILITRE
FT	:	FOOT	M/S	:	METRE PER SECOND
FT/MIN	:	FEET PER MINUTE	NM	:	NAUTICAL MILE
HRS	:	HOURS	PAX	:	PASSENGERS
IN	:	INCH	PILOT	:	PILOT IN COMMAND
INFO	:	INFORMATION	REP	:	REPUBLIC
KG	:	KILOGRAMME	RPM	:	REVOLUTIONS PER MINUTE
KM	:	KILOMETRE	RWY	:	RUNWAY
KT	:	KNOTS	T	:	METRIC TON
L	:	LITRE	TEKR	:	TERRITORY
TON	:	TONNE	Y	:	YARD

Note: Abbreviations for the names of geographic locations are also given in the following period.



**National Transportation  
Safety Board**

**Memorandum**

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Date: May 6, 1985

To: Jack Young

From: R. G. Rodriguez

Subject: Information Involving Operation of EAL 980, La Paz, Bolivia, January 1, 1985  
(DCA 85-R-A007)

1. History of Flight

The accident crew originated the flight sequence in Miami (MIA) at approximately 1330 <sup>1/</sup> on December 31, 1984, as EAL 987 (N819EA). The scheduled sequence was a round trip to Asuncion, Paraguay (ASU) with scheduled stops at Guayaquil, Ecuador (GYE) and La Paz, Bolivia (LPB) southbound; and scheduled stops at LPB, Arica, Chile (ARI), and GYE northbound. Since the captain did not have the special qualification to operate into LPB, a check captain was scheduled to accompany him and qualify him for takeoffs and landings at LPB on the southbound trip.

EAL 987 operated routinely and arrived at ASU at approximately 0034. The cab driver who routinely transports EAL crews between the hotel and airport recalled that the crew on this occasion did not wish to "have a cup of coffee" or even attend the New Year's Eve party which was in progress at the hotel, but rather they stated that they going to retire for the night. The cab driver met the captain, first officer, and flight engineer for "breakfast" the next morning at approximately 1030. In fact, he talked the hotel personnel into preparing breakfast for the crew even though they had technically ceased serving breakfast at 1000. He then took the flight crew on a tour of the area, which lasted until approximately 1600. They changed clothes while he waited, and then he took them to the airport.

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<sup>1/</sup> All times are Atlantic Standard, based on the 24-hour clock. At the time of the accident Paraguay was on Atlantic daylight time locally.

The Maintenance Supervisor for EAL at ASU reported that aircraft N819 was cleaned internally and visually checked externally. Since there were no problems the aircraft was "buttoned up" for the night and the ground crews secured for the night. No maintenance work was required or performed on January 1, and the departure of EAL 980/1 was routine. Although 5 quarts of hydraulic fluid was added in LPB southbound, none was required in ASU. They did service the engines with 2, 2, and 1 quart of oil for engines 1, 2, and 3, respectively. They also added 9,750L (approximately 2576 gallons) of Jet A-1 fuel. His last observation, prior to passenger boarding, placed the check captain and the deadheading captain in the first row of first class seats. As the aircraft taxied out the captain and first officer were in their respective seats. He could not see the flight engineer or jump seat.

The operations agent and passenger service agents who handled EAL 980/1 all reported routine activity, except that the crew was unfamiliar with the ASU terminal building (location of EAL operations, how to get to transit area to purchase souvenirs, etc.). Both passenger service agents stated that the check captain and the deadheading captain were seated in the first class section just before departure from the gate.

EAL 980/1 taxied out at ASU at approximately 1846, and was cleared to LPB via UA320D, maintain FL350 while in control area, with a left turn after takeoff, and a climb on course. The flight departed ASU at 1850, and was switched to the departure frequency of 128.4 Mhz.

The flight made a routine position report over Sucre VOR (134°/225 miles from LPB VOR) at 2015, estimated Dakon intersection (134°/55 miles) at 2037, and subsequently requested descent clearance. The area controller cleared EAL 980/1 to descend to FL250 and advised them of a "CB" (thunderstorm) southeast of LPB. After passing Dakon they were advised to descend to FL180 and to report 20 miles out (the control switchover point between area and tower control). EAL 980/1, acknowledged the descent and advised they would call 20 miles out. This was the last air traffic communication with the flight.

During the enroute phase of the flight there were no known problems with the aircraft, and none were mentioned when EAL 980/1 contacted the LPB operations office at approximately 2040. During this exchange with the LPB operations agent they were advised that the suggested minimum/maximum fuel load was 23,000 pounds, and that there was lightning southeast about 40-45 km (approximately 25 miles). The ramp estimate at that time was 2055.

EAL 980/1 crashed on Mt. Illimani (elevation 21,004 feet) at the 20,000-foot level, on the 108° radial at 26 miles from the LPB VOR (approximately 12 miles north of UA 320). There were no known eye witnesses to the accident, and the wreckage was not found until January 2, 1985 at approximately 1630.

## 2. Additional Interviews

The Assistant Manager of the hotel confirmed that the flight crew of EAL 980/1 did not attend the New Year's Eve party. He was very aware of the EAL personnel because, as a result of overbooking for the holiday, the cabin crews had graciously agreed to "double up" rather than remain in private rooms. In appreciation he invited the "layover" personnel as his guests at the party. Neither he nor the table waiter had any contact with the arriving crew from EAL 987/31 at the party. He commented that after approximately midnight the party had "wound down" rapidly as the casino reopened, and only two male cabin attendants had been at the party after that. He did recall the incoming crew arriving in the hotel during this cleanup phase of the party. He also reported that he had seen the deadheading captain in the pool area at approximately 0900 on January 1, and they had spent several hours together strolling around the gardens and hotel grounds discussing common interests in horticulture.

## 3. Crew Information

Captain Lawrence T. Campbell, born [REDACTED], was hired by EAL on August 26, 1963. He held Airline Transport Pilot Certificate No. [REDACTED] with ratings for airplane multiengine land, B-727, DC-9, LR-JET and commercial privileges for airplane single engine land and sea. He received a type rating in the B-727 on October 25, 1977, and completed his last proficiency check on December 27, 1984. However, the training records did reflect a problem with the previous regularly scheduled proficiency check which was failed on December 23, 1984. On that occasion he was graded unsatisfactory in the following maneuvers:

- |                               |                            |
|-------------------------------|----------------------------|
| 1. takeoff V <sub>1</sub> cut | 7. ADF approach            |
| 2. rejected takeoff           | 8. no glide slope approach |
| 3. holding                    | 9. engine out landing      |
| 4. steep turns                | 10. abnormal procedures    |
| 5. approach to stalls         | 11. emergency procedures   |
| 6. missed approach ILS        | 12. two-engine ILS         |

This check, which lasted 4 hours, was turned into a training ride. The check captain involved stated that he had no previous knowledge of Captain Campbell, but that the oral and the first portion of the flight were poor. They repeated several maneuvers, and at the break in the period he had not yet made his mind up about the grade. In the second half the performance was about the same, and the instructor advised him that he was going to be given a "down", with a recommendation for an additional training period prior to recheck. The instructor commented that Captain Campbell had a good attitude throughout the flight, and although it is rare for a pilot to do so poorly, he had seen worse. He also stated that there was nothing marginal in the performance, the unsatisfactory maneuvers were unsatisfactory.

On December 26, 1984, Captain Campbell received a 3+30 hours training ride. The check captain on this occasion reported a smooth flight with better than average airmanship, cockpit management, and staying ahead of the aircraft. He did have some foreknowledge of problems on the previous rating ride, and recalled that Captain Campbell simply said he fell apart, was "uptight", and "rough in all areas." The check captain also commented on the fairness of the instructor who had given the down. He recommended a recheck for Captain Campbell.

On December 27, 1984, Captain Campbell satisfactorily completed a proficiency check and was returned to line duty. The check captain commented that they repeated the steep turns, and complimented Captain Campbell on the "V<sub>1</sub> cut" and "engine out landing" maneuvers. He also recalled Captain Campbell by face from training 20 years previously, but knew nothing of his line reputation etc. In the informal conversations during the check there was no indication of any abnormal problems with health, business, etc. Captain Campbell said he had a bad case of "checkitis" on the previous proficiency check.

In marked contrast to the December 23 "down", most proficiency checks, enroute and professional evaluations in his company records reflected laudatory comments, e.g. "good flight," "excellent ride," "good job," "very professional," "very smooth." There were eight letters from passengers in his personnel folder, five in the last six months, commending him for various aspects of his duties.

At the time of the accident he had accumulated a total of approximately 14,436 flying hours, of which approximately 4,725 were in the B-727. His last FAA first-class medical certificate was issued on December 3, 1984, with the limitation that "Holder must have in possession glasses for near vision while exercising the privileges of his airman certificate."

Captain Joseph B. Loeth, Jr., born [REDACTED], was hired by EAL on December 13, 1965. He held Airline Transport Pilot Certificate No. [REDACTED] with ratings for airplane multiengine land, DC-9, B-727, and commercial privileges for airplane single engine land and sea. He received a type rating in the B-727 on November 29, 1983, and completed his last proficiency check December 20, 1984. He was approved as a company check airman February 28, 1984. At the time of the accident he had accumulated a total of approximately 9,807 flying hours, of which approximately 325 hours were in the B-727. His last FAA first-class medical certificate was issued October 11, 1984, with the limitation that, "Must have glasses available for near vision."

First Officer Kenneth R. Rhodes, born [REDACTED], was hired by EAL on November 23, 1970. He held Commercial Pilot Certificate No. [REDACTED] with ratings for airplane single and multiengine land and instrument. He also held Flight Engineer Certificate No. [REDACTED] with ratings for turbojet powered aircraft. He was initially qualified on the B-727 as second officer on March 10, 1971, upgraded to first officer in October 1974, and requalified on September 25, 1981 2/. His last proficiency check was completed on December 15, 1984. At the time of the accident he had accumulated approximately 5,941 total flying hours, of which 2,247 hours were in the B-727. His last FAA first-class medical certificate was issued on September 24, 1984, with the limitation that, "Holder shall possess correcting glasses for near vision while exercising the privileges of this airman certificate."

Second Officer Mark L. Bird, born [REDACTED], was hired by EAL on October 10, 1984. He held Flight Engineer Certificate No. [REDACTED] with a rating for turbojet powered aircraft. He also held an Airline Transport Pilot Certificate with ratings for airplane single and multiengine land and DC-9. His last proficiency check was completed on November 28, 1984. At the time of the accident he had accumulated in excess of 2,500 total flying hours, of which approximately 55 hours were in the B-727. His FAA first-class medical certificate was issued August 31, 1984, with no limitations.

#### 4. Aircraft Information

N819EA, a Boeing B-727-225A, S/N 22556, was manufactured in April 1982. At the time of the accident it had accumulated 8,613 flying hours. The maximum allowable takeoff gross weight was 164,740 pounds (weight limited by landing at LPB) and the maximum allowable landing weight was 147,140 pounds. The center of gravity (cg) was 21.6% MAC, well within the forward and aft limits of 9% and 37% MAC, respectively.

The calculations for the takeoff at ASU were as follows:

Actual zero fuel weight	116,180 pounds
Fuel load	33,000 pounds
takeoff weight	149,180 pounds

The planned fuel burn was 17,600 pounds giving a planned landing weight at LPB of 131,580 pounds.

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2/ First Officer Rhodes had two extensive periods of sick leave from October 10, 1975, until January 30, 1976, due to an automobile accident; and October 15, 1979, to September 11, 1981 due to allergies.

# 5. Navigational Aids

The computer flight plan and route of flight for EAL 980 on UA 320D 3/ involved the following geographical fixes, and course changes:

<u>Location</u>	<u>Nav Aid</u>	<u>Distance</u>	<u>Time</u>	<u>Course</u>
Asuncion	VOR & NDB		1	0190
Top of Climb		103	16	3280
Filadelfia	NDB & X	115	16	3280
Esela	X	149	20	3110
Camiri	NDB & X	92	12	3100
Sucre	VOR & NDB	116	16	3050
Opuro	X	57	8	3140
Begin of Descent		104	14	3140
Dakon	X	9	1	3140
La Paz	VOR & NDB	55	11	3140

The only known reported discrepancy with these nav aids involved the LPB VOR. The DME function was notamed out of service when the monitor system failed. The monitor was replaced in November 1984, but had not been rechecked and was still listed out of service. All other nav aids were operational with no known malfunctions or user complaints. However, the facilities do not have the same quality control exercised in the U.S. The LPB VOR was installed in October 1982, but was never officially flight checked until after the accident. The ILS was installed in December 1982, and a flight check was made by the Argentine AF. Following the accident the FAA flight checked all terminal and enroute nav aids normally used by the flight, including the ASU, LPB, SRE, and TCZ (Sucre and Santa Cruz) VOR's. The results were satisfactory.

During the course of the investigation, EAL 987/7 January 1985 and EAL 980/8 were observed. On both occasions the Filadelfia (FIL) beacon was inoperative. Since it is an "on request" facility, specific requests were made by the crew and NTSB to insure proper operation at the ETA of EAL 980/8. Although the controllers advised that it was on, the flight never received any signal from FIL. The captain of EAL 980/8, who was very familiar with this trip sequence, reported that this was very common and that he had been very active in trying to get EAL to install another Omega navigation system in the "South American" B-727's. In an informal letter to EAL in July 1984, he stated, "After two years of operation between MIA and ASU it is this captain's opinion that the South American operation has to depend on Omega navigation to insure a safe operation...."

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3/ The airway designation changed to UA 320 at Esela intersection where ASU control ended and LPB control began.

## 6. EAL Company Procedures

LPB is designated a special qualification airport because of the high altitude. EAL procedures require each captain to make one entry and exit, under the supervision of a check airman, for qualification at LPB. This was accomplished for Captain Campbell on EAL 987/31 (the southbound leg of this trip sequence). Captain Loseth, the check airman received his supervised flight qualification on January 30, 1984, and his only other experience at LPB was on April 5, 1984. The other crewmembers had never been to LPB; however, an EAL pilot friend of F/O Rhodes had frequent experience at LPB and had discussed operational considerations with him when the routes were first acquired (Summer 1982). A consensus of various pilots interviewed expected that F/O Rhodes would have occupied the jumpseat southbound to accommodate the check captain in the right seat, and still observe all activities related to the LPB operation. Similarly, they expected the check captain to occupy the jumpseat northbound and observe, even though the captain was then qualified, rather than sit in the cabin.

Captains were required to observe a Pictorial Airport and Route Training (PART) film which provided information about LPB and operations at that airport. It is not known if Captain Campbell saw this film. EAL required the captain to make all takeoffs and landings at LPB. Also, all crewmembers were required to use oxygen masks prior to cabin pressure altitude reaching 10,000 feet, until completion of the Securing Checklist. Finally, takeoff power was set with brakes held to maximize runway utilization.

The EAL instrument approach charts for LPB contained a notation in the plan view warning, "Caution: High terrain north thru southeast just beyond holding pattern airspace." This caution did not appear on the then current ILS DME Rwy 09R chart. The chart was changed November 9, 1984 (deleting a radial formerly defining a holding intersection) and there was no caution note, but a mountain peak of 19,600 feet was identified northeast of the airport.

Following the accident EAL issued a company NOTAM restricting descent below FL 250 when approaching LPB from the east thru south, until within 20 NM of the LPB VOR, whether in instrument or visual meteorological conditions, until executing the approved instrument approach procedure. Similarly, outbound flights were not to deviate north of the LPB/134° radial until above FL 230.

*[Handwritten signature]*  
~~\_\_\_\_\_~~



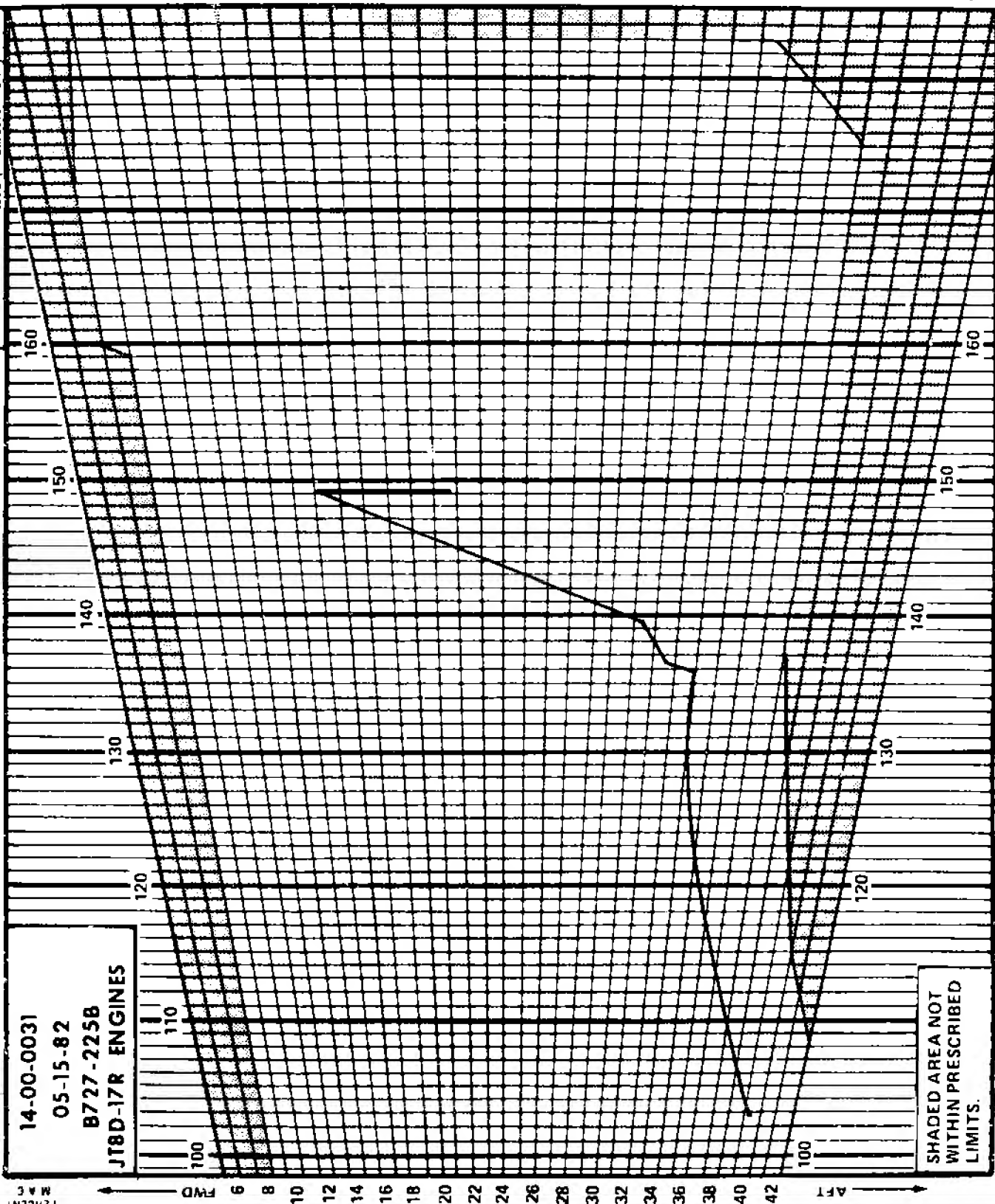
26982-3

13



# B-727-225B CENTER OF GRAVITY CHART

14-00-0031  
05-15-82  
B727-225B  
JT8D-17R ENGINES



FLIGHT DATE 980/02 STA ASU  
AGENT ASU  
OEWS MAC 102300 @ 59.3%  
TOGW 15180 (FROM 0010A FORM)

AIRPLANE TRIM UNITS  
AIRPLANE NOSE UP

	FLAP SETTINGS	
	5°	15°
7		250
8	7	7 3/4 8 1/2
9		
10	6 3/4	7 1/2 8 1/4
11		
12	6 1/2	7 1/4 8
13	6 1/4	7 7 3/4
14		
15	6	6 3/4 7 1/2
16		
17	5 3/4	6 1/2 7
18		
19	5 1/2	6 6 1/2
20		
21	5	5 3/4 6 1/4
22		
23	4 3/4	5 1/4 5 3/4
24		
25	4 1/2	4 3/4 5 1/4
26		
27	4	4 1/2 4 3/4
28		
29	3 3/4	4 4 1/4
30		
31	3 1/2	3 3/4 4
32		
33	3 1/2	3 1/2 3 3/4
34		
35	3 1/4	3 1/4 3 1/2
36	2 3/4	3 3
37		
38	2 1/2	2 1/2 2 1/2
39		
40	2 1/2	2 1/2 2 1/2
41		

980	01 JAN 85	819	12/137	727-225B	C 22	8D-17R1	150
REPORTED AIRPORT	REPORTED ALTITUDE	REPORTED WIND	REPORTED WIND	REPORTED WIND	REPORTED WIND	REPORTED WIND	REPORTED WIND
02	11000 FT	900	A-300 ONLY	000	000	000	000
PERFORMANCE ADJUSTMENTS NOTES							
MAX ALT 11000 FT. WIND AT LPB							
BASED ON 46° F 1034 TIL							

15

980/01

819

5800

1220

CARGO BIN LOAD DESCRIPTION		ACTUAL LOAD	STATION	STATION	STATION	STATION
TOTAL WEIGHT			LPB	ARI	GYE	MIA
0	THROUGH CARGO WEIGHT	0				
0	EXPRESS	0				
8644	FREIGHT	8640			8327	322
2	COMET	2				2
400	MAIL PRIORITY	440			440	
32	MAIL NON-PRIORITY	232				32
1155	1 BAGGAGE	692			264	428
9938	TOTAL CARGO	9815			4031	784
0	CONTAINER WEIGHT	0				
9938	TOTAL BIN LOAD	9815	ENTER IN ITEM 14			

DISTRIBUTION Original - Flight Captain. Retain for duration of flight.  
Duplicate - Station File. Attach to copy.


 **EASTERN**

14-00000 DPM-252 DE 11 00

**PLANNED LOAD**

**ACTUAL LOADING**

REMARKS	2000C / 060 <sup>2</sup> - 1 MIL 70	ONLINE	OFFLINE	LOCAL
UIC VIA GFE OBCD FM 987/3-02 Bin 2				


	YES	NO	BIN #		YES	NO	BIN #
BIN WEBBING SECURED	✓			LIVE CARGO		✓	
MISSING OR DAMAGED		✓		LIQUOR SHIPMENT		✓	
RESTRICTED ARTICLE		✓		CARGO SYSTEM OPERATIVE		✓	
HUMAN REMAINS		✓		AGENT'S SIGNATURE			
				BRAMP SERVICEMAN'S SIGNATURE			

NOTE: RETURN CARGO WORKSHEET TO LOAD PLANNER AS SOON AS POSSIBLE AFTER FLIGHT DEPARTURE. CONTACT LOAD PLANNER IMMEDIATELY WHEN DEVIATION FROM LOAD PLAN IS EXPECTED - TO AVOID DELAY.

10 FIBROS - 924 (K)

50724 : 8328\*

DIRECCION GENERAL DE AERONAUTICA CIVIL

 Aeropuerto Internacional Presidente Stroessner		<b>PLAN DE VUELO</b> FLIGHT PLAN		ASUNCION PARAGUAY
INDICADOR DE PRIORIDAD Priority Indicator		INDICADOR(ES) DE DESTINATARIO(S) Addressee(s) Indicator(s)		
HORA DE DEPÓSITO Filing Time		INDICADOR DEL REMITENTE Originator Indicator		
IDENTIFICACION(S) DE DESTINATARIO(S) Y/O DEL REMITENTE Specific identification of addressee(s) and/or originator				
1	DESCRIPCION Description	2	IDENTIFICACION DE LA AERONAVE Aircraft identification and SSR data	8
				REGLAS DE VUELO Y TIPOS DE VUELO Flight rules and type of flight
<=> [FPL] — EA 930 — IS <=>				
9	NUMERO Y TIPO DE AERONAVE, CATEGORIA DE ESTEREA Number and type of aircraft and wake turbulence category		10 EQUIPO Equipment COM/NAV/APP - SSR	
— B727-200 / A1 — S — IC <=>				
13 AERODROMO DE SALIDA Y HORA Aerodrome of departure and time		LIMITES DE LA FIR Y HORAS PREVISTAS FIR boundaries & estimated times		
— SCAR 2240 —> SLP 2340				
<=>				
15 VELOCIDAD DE CRUCERO Level		RUTA Route		
— 0460 F 350 —> UA 3200 P2				
<=>				
17 AERODROMO DE DESTINO Y HORA Aerodrome of destination and time		AERODROMO(S) DE ALTERNATIVA Alternate aerodrome(s)		
— SLP 0040 —> SCAR				
<=>				
18 DATOS ADICIONALES Other information				
— REG AIRSEA				
EN LOS MENSAJES FPL NO HAY QUE TRANSMITIR ESTOS DATOS Not to be transmitted in FPL messages				
19 INFORMACION COMPLEMENTARIA Supplementary Information				
AUTONOMIA Endurance		PERSONAS A BORDO Persons on board		EQUIPO DE EMERGENCIA Y SUPERVIVENCIA Emergency & survival equipment
COMBUSTIBLE 0330 —> POB/ —> HOO/ 121,5 —> 243				
EQUIPO Equipment		CHALECOS SALVAVIDAS Life jackets		FRECUENCIA Frequency
POLAR —> DESERTICO —> MARITIMO —> SELVA —> CHALECOS —> LUZ —> FLUORESCENTE —>				
BOTES NEUMATICOS COLOR Dinghies Colour		NUMERO Number		CAPACIDAD TOTAL Total capacity
BOTES —> COBIERTA —> RMK /				
Nombre del piloto al mando Name of pilot in command				
CAMPBELL L.				

FORM 34 (REVISED 1-1-60)  
 PREPARED BY EXPORTER  
 OR BROKER OR FREIGHT  
 FORWARDER OR EMPLOYEE

EASTERN AIR LINES, INC.

NAME OF EXPORTER OR ASSOCIATED  
 PERSON OR FIRM, ADDRESS AND CITY, STATE  
 AND ZIP CODE OF NATIONALITY AND ORIGIN OF EXPORTER

DATE JAN 21 6

CUSTOMS  
 NO. 100-100

905

DATE RECEIVED  
 JAN 21 60

NAME OF SHIP  
 PORT OF ORIGIN  
 AND OF DESTINATION

ASUNION \* PARAGUAY

PORT OF ORIGIN  
 PORT OF DESTINATION  
 NEW YORK, NY TRANSIT TRUCK CHANQUIL

(PLACE) (ADDRESS) (RECEIVED)

(PLACE) (ADDRESS) (RECEIVED)

AIRWAY BILL NUMBER NUMERO DE LA CARTA DE FONTO AEREO (NUMBER OF THE LETTER OF TRANSPORT)	NUMBER OF PACKAGES NUMERO DE BULTOS MONERO DE CARGA	NATURE OF GOODS NATURALEZA DE LAS MERCANDIAS NATURE DES MARCHANDISES	FOR USE BY OWNER OR OPERATOR PARA USO EXCLUSIVO DEL PROPIETARIO O EXPLOTADOR RELLEV AU PROPRIETAIRE OU L'EXPLOITANT		FOR OFFICIAL USE ONLY SOLO PARA USO OFICIAL RESERVE A L'ADMINISTRACION
CARGO IN TRANSIT TRUCK CHANQUIL, ECUADOR.					
AIRWAY DISPOSITION: NEW YORK, NY - U.S.A.					
637-ASU	6654 4515	45 PC	SKINF	3-778 K	REPUBLIC NATIONAL BANK OF NEW YORK, NY
*TRANSIT AIR C/ RGO MANIFEST: #					
RECEIPT: RECEIVED THE CARGO LISTED HEREIN FOR DELIVERY TO U. S. CUSTOMS PORT OF ORIGIN/STATION ABOVE OR PER DIRECT EXPORT.					
ATTENTION OF AGENT FOR CARRIER (SIGNATURE) JESUS BARANDA					
NAME OF CARRIER DATE					

\*TRANSIT AIR CARGO MANIFEST: #

RECEIPT: RECEIVED BY CARGO LISTED HEREIN FOR DELIVERY TO U.S. CUSTOMS  
 (THIS IS NOT VALIDATION EXCEPT ABOVE OR FOR SHIPMENT EXPORT)

SIGNATURE OF AGENT  
 FOR CARRIER  
 (SIGNATURE)

JESUS BARANDA

NAME OF CARRIER

DATE

## 20



DU AIR#2 88100  
.ASLOGER 021531/042615  
ATT DAVE ROBERT \*\*\* SCREEN NBR 1 \*\*\*  
FLT 950 DATE 01JAN85 A/C NO 819 SERT CONFIG 12/137.  
WEIGHT CHART 0.22.. ENGINE RATING 83-17R1  
FLAP 15.DEG.  
T/O RUNWAY 02.... LENGTH 11000.FT.  
TEMPERATURE 90F.... WIND 0000.....  
COMPONENT 0..... APPLIED 0.....  
MAX ALLOW LANDING WGT 147140.....  
FUEL BURNOFF 17600.....  
MAX T/O FOR LANDING NEXT STOP 164740.....  
CERTIFICATE LIMIT 172700.....  
WIND/TEMP ADJUSTED LIMIT 191000.....  
CLIMB LIMIT 191000  
OTHER LIMIT...NIL.....  
END SCREEN NBR 1  
J.C.BREZ  
;  
02JAN1533 0044 SEJ



# ESSO STANDARD PARAGUAY S. A. - EXXON

Estrella 345 - 5º Piso - Teléf. 82031/34

Depósitos y Ventas: Calera Cué

Varadero 17 y 18 - Tel. 80951 - Asunción

Oficina Despacho Villa Elisa

Oficina Despacho Hernandarias

Oficina Ventas: Aerop. Pte. Stroessner

Asunción - Paraguay

Reg. Imp. a la Renta y Registro  
de Vendedores No. ESPA 57554

**C** Nº 08512

## BOLETA DE ENTREGA

## PRODUCTOS DE AVIACION

Aeropuerto Pte. Stroessner Fecha 1º ENERO de 1985

Señor EASTERN

Dirección CIUDAD

Localidad ASUNCIÓN

Matrícula del Avión No. N 819 EA

Tipo del Avión BOEING 727

Carnet No. \_\_\_\_\_

Provisión desde Estación Aéreo

Análisis Tipo No. \_\_\_\_\_

Condiciones de venta \_\_\_\_\_

PRODUCTOS	GRADO	LITROS	GALONES	ENVASES	
				TIPO	CANTIDAD
NAFTA AVIACION ESSO					
ESSO AVIATION TURBOFUEL	A-1	9750	2.576	GRUEL	
ESSO AVIATION OIL					
SON: DOS MIL QUINIENTOS SETENTA Y SEIS					
GALONES					

Lectura del medidor

Horario de Carga:

Antes de la Carga - No. 9972631

Comenzó 1845

Después de la Carga - No. 9975207

Terminó 1910

Entregado por:

Firma:

He recibido a mi entera conformidad por cuenta de la empresa o persona del rubro los productos y envases detallados más arriba.

Firma:

Nombre

Aclarado

Cargo:

TRIPLICADO PARA EL DESTINATARIO

# FUEL/OIL REQUIREMENT RECORD

14-00-0060

OPR-252

REV. 1/78



EASTERN

STATION H5U	FLIGHT/DATE 980/1	AIRCRAFT NO. 819
MINIMUM FUEL 32000	MAXIMUM FUEL 46457	REQUESTED FUEL LOAD 33000

ACTUAL INBOUND FUEL LOAD	POUNDS	ACTUAL OUTBOUND FUEL LOAD	POUNDS
--------------------------	--------	---------------------------	--------

AMOUNT OF FUEL ADDED GALLONS 2550	TIME 1845	DATE 01/01/81
--------------------------------------	--------------	------------------

FUELED BY (SIGNATURE)

*[Signature]*

## OIL CHECK

NO. 1 ENGINE 21 QTS.	NO. 2 ENGINE 21 QTS.	NO. 3 ENGINE 1 QTS.	NO. 4 ENGINE 1 QTS.
-------------------------	-------------------------	------------------------	------------------------

TIME 07:45	DATE 1/1/81	SIGNATURE <i>[Signature]</i>
---------------	----------------	---------------------------------

REMARKS:

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BBPCUF

PPH FLT NBR 0980 DATE 01 CRPT MIN (R,N,C OR B) D  
DEPT DEST ETE TBS ZPDT ALT RTE DESCRIPTION  
/ ASD LPB 01: 54 .....  
/ LPB ARI 00: 25 .....  
/ ARI GYE 02: 59 .....  
/ GYE NIA 03: 53 .....  
ASG OK - SENT 012157 .....

QU ASD00  
NIAAUA 01/1823  
CLR  
980/01 P819

DISPATCH RELEASE

ORG	DST	RT	JAR	MFUL	BO	FL	NBR	I&H	R	C	FCODE	EFU	P
ASD	LPB	1	ARI	320	176	35	58	23	46	17	U1	0	Y
LPB	ARI	1	LPB	200	65	24	57	24	46	8	U9	0	
ARI	GYE	1	CLO	500	289	35	105	34	46	26	U9	0	
GYE	NIA	1	FLL	500	378	35	26	16	46	34	U0	0	

1816 CLARK BRILLHART

PH

FB: 987 TO: NO ROUTING NO A1 F0 E1 DA  
REMARKS: MAX IN-MIN OUT GYE DUE TO FUEL RESTRICTIONS  
HAPPY NEW YEAR

FUEL 33,000 -- REV ETE ----- CREW MINIMUM A B C D

RELEASE ACCEPTED (CAPT SIGN) -----

01JAN1823 0075 SEF

## AIR/GROUND COMMUNICATIONS RECORD

14-CC-0760

OPR-252

REV 9 80

EASTERN

FAR 121.711

Refer to SP 70-7620

RECORDING STATION HISJ	FLIGHT NO. 987/980	DATE 31 DEC 84	FREQUENCY 130.3	MHz
---------------------------	-----------------------	-------------------	--------------------	-----

## INBOUND

STATION	PRESSURE ALTITUDE FT MB		HWS ALTIMETER Hg	
FLIGHT	FIELD PRESSURE Hg	OTHER INFO.		
STATION	STATION FIELD PRESS Hg	MINIMUM FUEL LBS.	MAXIMUM FUEL LBS.	SUGGESTED MAX. FUEL LBS.
	TEMPERATURE °F	WIND	WEATHER	
FLIGHT	FUEL ON BOARD	FUEL OUT	MAINT. STATUS <input type="checkbox"/> GO <input type="checkbox"/> NO GO	OTHER INFO.
STATION	OTHER INFO. APU INOP. (RELAY TO MR. VERON)			

\* NOTE: Provide weather information to DC-9 crews only on request.

OPERATOR'S INITIALS:

TIME:

ARRIVAL ► FORTOI				DEPARTURE ► FORTOD			
FLIGHT	ON 04 37	IN 04 34	FUEL 76.5	FLIGHT	OUT 2240	OFF 2257	FUEL 77.0
STATION	OTHER INFO.			STATION	OTHER INFO.		
OPERATOR'S INITIALS: J.C. TIME: 0440				OPERATOR'S INITIALS: J.C. TIME: 2258			

DISPOSITION: Retain in station file 30 days, then destroy.

DATE TIME ADDRESS SOT FLAGS MSG RUN DATE 01/02/85 MESSAGE TEXT PAGE 1 INIT APPL TERM ID ID

0101 130654 0000 24 TM 0153

OP ASUXPEA  
MIAXEEA 011806Z  
CZ980/01 ASU-LPB 727-2258/3 PAY 80 AFU 144 LCM 1253-  
ETD 2240Z BTB 2.08 10D 10 TOT 4 A/C 819-

RGW 1429 OUT ON SKDARR 0048Z-  
ZFW OFF IN 2048AS-  
OUT FUEL IN FUEL EYA-GATE

0150 TPT  
ASU FIELD 52514.4/405731.2- TME EYA RETA ATA T/80 A/80 -  
WAS 52508.4/405729.7 1 16 54  
IOC 16 75  
FIL 16 75  
FIRESELA 52054.2/406213.8 20 101  
CAMIMI 52001.0/406313.9 12 117  
SPE 51900.4/406517.2 16 137  
OPORD 51422.1/406602.4 2 146  
DND 51707.1/406517.0 1 163  
LPB FIELD 51631.0/406211.0 11 176

0150  
FCC RIE DI 300MM ELV LPB 13310-  
DUT WAS 04320U ELLA 04320 FAZ DCT  
ASU (IATA) SCAS (ICAO)-  
LPB (IATA) SLEP (ICAO)-

0150  
TO DST MC FL DAT WIND DPT EPR TAS G/S DICO TME T/80-  
VGS 4 019 35 -14 22 15 R01 192 372 383 697 16 17 54-  
IOC 183 326 35 -44 27 28 R02 191 460 441 582 16 33 75-  
FIL 115 326 FIR- SLEP--  
FIP 149 309 35 -44 27-22 R01 190 461 442 433 20 53 101-  
ESCLA 149 309 35 -44 26 21 R02 189 461 447 361 12 1.85 117-  
CAMI 92 310 35 -44 25 16 R01 188 461 450 322 16 1.21 137-  
SPE 116 304 35 -44 24 16 R01 187 461 454 308 8 1.28 146-  
OPORD 57 314 35 -44 26 11 R01 186 461 455 64 14 1.42 163-  
BOD 104 314 35 -44 26 11 R01 186 461 455 64 14 1.42 163-  
DND 9 314 35 -44 26 11 R01 186 461 455 64 14 1.42 163-  
LPB 55 314 35 -44 26 11 R01 186 461 455 64 14 1.42 163-  
ALT SPD T/80-GMA RGM MRCW ANAR F/COST FCPM -  
35 M78 1.54 176/07 1429 1721 -009-43 5876 7.06-  
35 M78 1.57 177/11 1430 1509 -010-51 5713 7.06-  
31 M78 1.52 185/06 1438 1730 -008-34 5961 7.39-

00AF  
END OF JOURNAL

Eastern Air Lines

NOV 9-84 (11-7)

LA PAZ, BOLIVIA

KENNEDY INT'L

ILS DME Rwy 09R

LOC 110.3 ILP

Apt. Elev 13310'

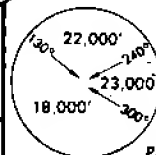
LA PAZ Approach 119.5

LA PAZ Tower 118.3

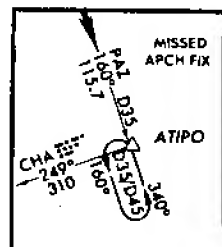
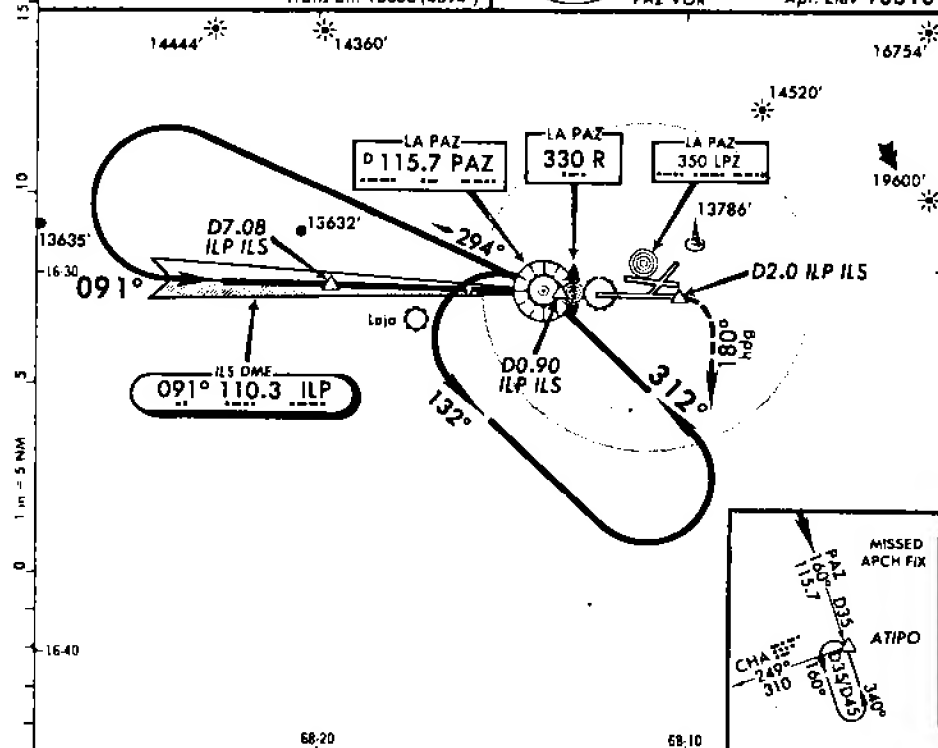
Ground 121.9

Alt Set: MB (IN on req)

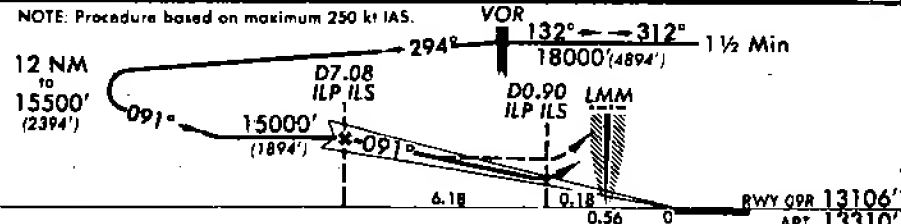
Trans level: By ATC  
Trans alt: 18000'(4894')



MSA  
PAZ VOR



NOTE: Procedure based on maximum 250 kt IAS.



**MISSED APPROACH:** Climb outbound on PAZ VOR R-091 until crossing D2.0 ILP ILS at or above 13680'. Turn RIGHT to 180° heading to intercept and proceed outbound on PAZ VOR R-160. Cross D25.0 PAZ VOR at 17000', continue climbing to 18000' to ATIPO INT and hold. Request instructions from CONTROL for returning to PAZ VOR. NOTE: Minimum rate of climb 122'/NM.

STRAIGHT-IN LANDING RWY 09R		CIRCLE-TO-LAND	
ILS		NA North of Rwy 09R 27L Centerline Extended	
MDA 13500'(394')		DAY	
MM OUT		NIGHT	
1.0 NM		14200'(890')-2.6 NM	
1.5 NM		NA	
LOC(GS out)			
MDA 13900'(794')			

Grnd speed-Kts	70	90	100	120	140	160	Functioning VASI lights required for night landing.
GS	2.50°	315	405	450	539	629	
MAP at D0.90 ILP ILS							

CHANGES: Atipio Int designation.

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# LA PAZ, BOLIVIA

KENNEDY INT'L

516 31.0 W068 11.0

Elev 13310' Var 01°W

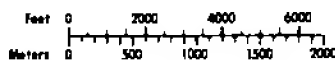
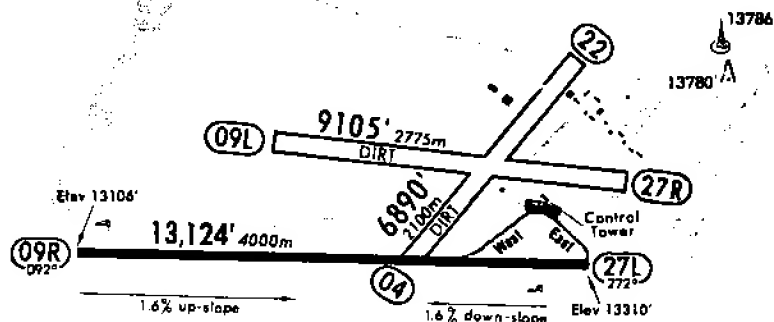
SLP 11-7 NOV 9-84

Eastern Air Lines

LA PAZ Ground 121.9

Tower 118.3

CAUTION: Overflying city prohibited.  
NOTE: Airport of entry.



## ADDITIONAL RUNWAY INFORMATION

RWY		USABLE LENGTHS			TAKE-OFF	WIDTH
		Threshold	LANDING BEYOND	Glide Slope		
04	Flares				NA	394' 120m
22	Flares				NA	151' 46m
09R	HIRL REIL VASI			12136' 3699m	NA	394' 120m
27L	HIRL REIL	②	NA		NA	
09L	Flares					
27R	Flares					

- ① CAUTION: 8' to 10' drop at threshold rwy 27L.  
② NA when wind is less than 9 kt from the west.

TAKE-OFF		FOR FILING AS ALTERNATE	
187 Eng	300-2.6 NM	A	1000-2.6 NM
384 Eng		B	
		C	
		D	
<input type="checkbox"/> Circling not authorized north of rwy 09R-27L centerline extended.		<input type="checkbox"/> Functioning VASI lights required for night landing rwy 09R.	

CHANGES: See other side.

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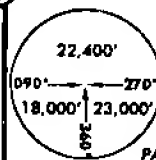
Eastern Air Lines

JUL 9-82 (13-7)

LA PAZ Approach-See first apch chart for freq.

LA PAZ Tower 118.3

Ground 121.9



LA PAZ, BOLIVIA

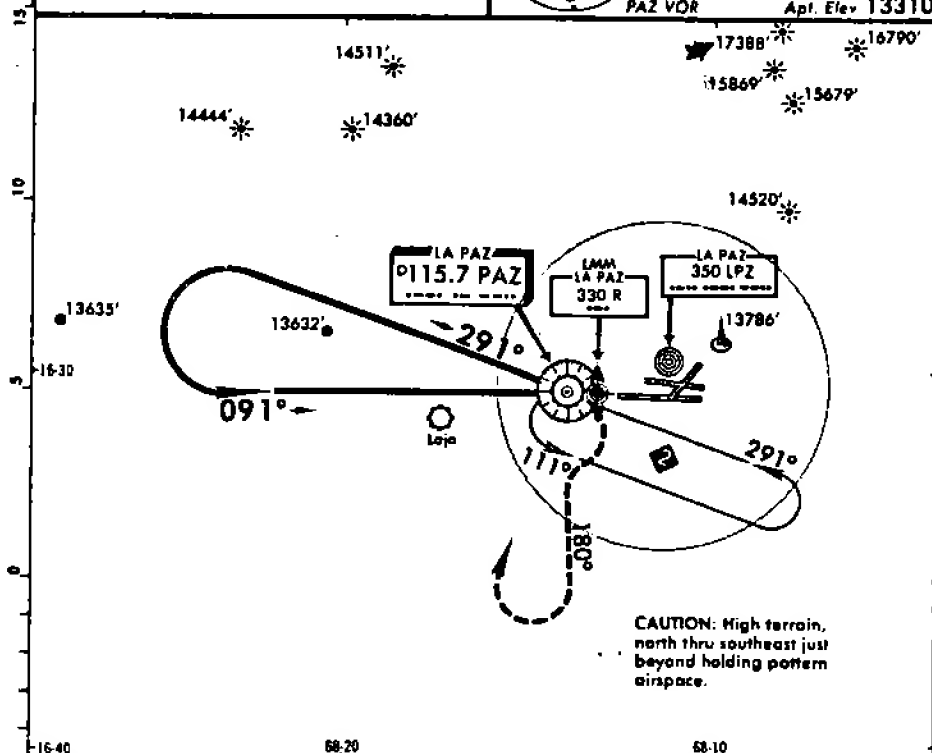
KENNEDY INT'L

VOR-1 Rwy 09R

VOR 115.7 PAZ

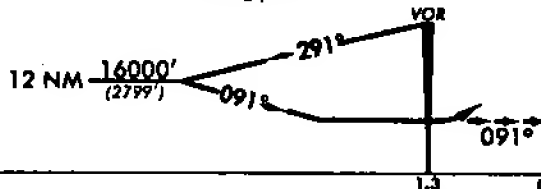
Class VOR/DME

Apt. Elev 13310'



NOTE: Maintain MEA, MOCA or higher until over PAZ VOR.  
Do not exceed 265 kt IAS in holding pattern.

Altimeter Setting in MILLIBARS  
(INCHES on Request)



TRANS LEVEL BY ATC  
TRANS ALT: 18000'(4799')

TDZE 13201'

APT. 13310'

MISSED APPROACH: Climbing RIGHT turn to 16000' outbound on PAZ VOR  
R-180 then RIGHT to 18000' direct PAZ VOR and hold.

STRAIGHT-IN LANDING RWY 09R

MDA 13900'(699')

CIRCLE-TO-LAND

NA North of Rwy 09R-27L  
Centerline Extended

DAY

NIGHT

A	
B	
C	
D	

A	
B	
C	
D	

NA

--	--	--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--	--	--

MAP of VOR

Functioning VASI lights required for night landings.

CHANGES: Visibilities

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Eastern Air Lines

JUL 9-82 (13-8)

LA PAZ Approach-See first apch chart for freq.

LA PAZ Tower 118.3

Ground 121.9

LA PAZ, BOLIVIA

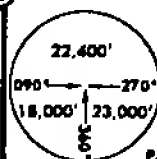
KENNEDY INT'L

VOR-2 Rwy 09R

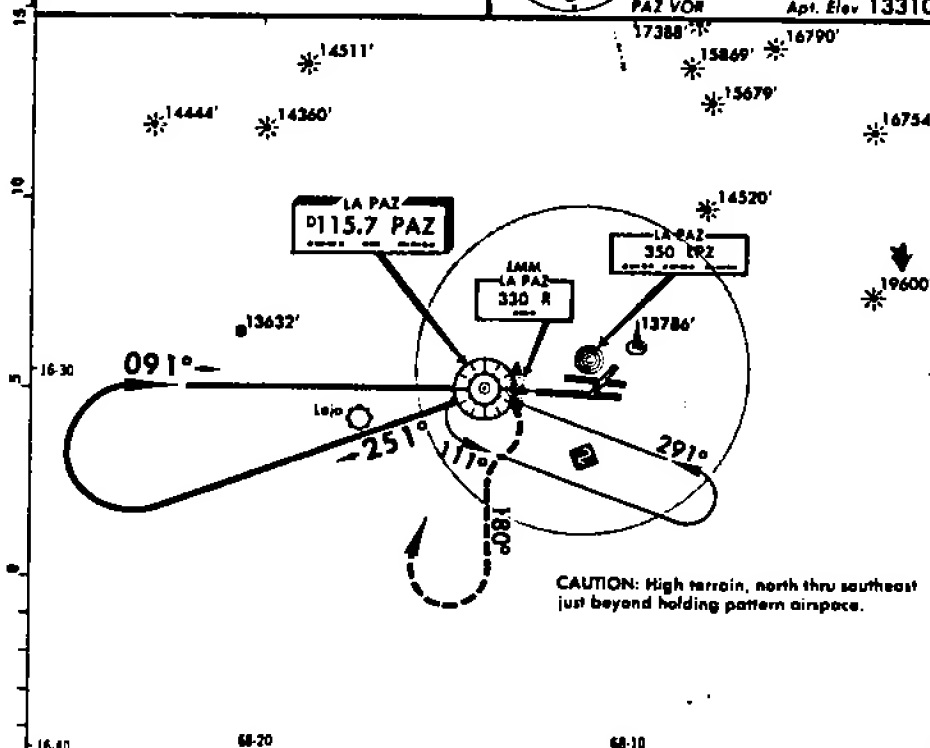
VOR 115.7 PAZ

Class VOR/DME

Apt. Elev 13310'



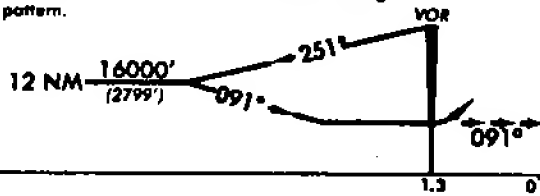
MSA  
PAZ VOR



CAUTION: High terrain, north thru southeast just beyond holding pattern airspace.

NOTE: Maintain MEA, MOCA or higher until over PAZ VOR. Do not exceed 265 kt IAS in holding pattern.

Altitude Setting in MILLIBARS (INCHES on Request)



TRANS LEVEL BY ATC  
TRANS ALT: 18000' (4799')

MISSED APPROACH: Climbing RIGHT turn to 16000' outbound on PAZ VOR R-180 then RIGHT to 18000' direct PAZ VOR and hold.

STRAIGHT-IN LANDING RWY 09R

MDA 13900' (699')

CIRCLE-TO-LAND

MA North of Rwy 09R-271  
Centerline Extended  
DAY

NIGHT

A  
B  
C  
D

1.5 NM

A  
B  
C  
D

14200' (890') 2.6 NM

NA

Functioning VASI lights required for night landings.

MAP of VOR

CHANGES: Visibility.

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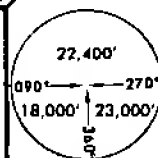
Eastern Air Lines

JUL 9-82 (16-7)

LA PAZ Approach-See first apch chart for freq

LA PAZ Tower 118.3

Ground 121.9



LA PAZ, BOLIVIA

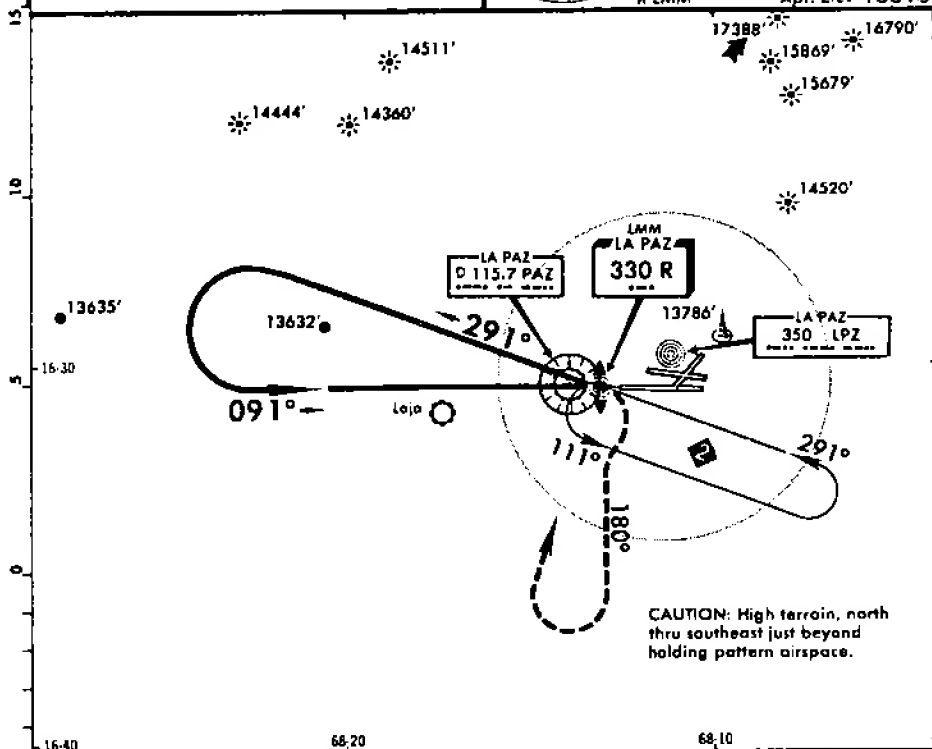
KENNEDY INT'L

NDB-1 Rwy 09R

NDB 330 R

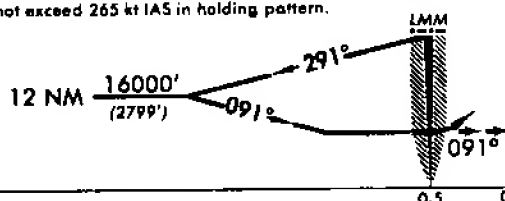
Class LMM

Apt. Elev 13310'



NOTE: Maintain MEA, MOCA or higher until over R LMM. Do not exceed 265 kt IAS in holding pattern.

Altimeter Setting In MILLIBARS (INCHES on Request)



TRANS LEVEL BY ATC  
TRANS ALT: 18000'(4799')

TDZE 13201'  
APT. 13310'

MISSED APPROACH: Climbing RIGHT turn to 16000' on 180° then RIGHT to 18000' direct R LMM and hold.

STRAIGHT-IN LANDING RWY 09R

MDA 13900'(699')

CIRCLE-TO-LAND

NA North of Rwy 09R-27L  
Centerline Extended

DAY

NIGHT

A  
B  
C  
D

A	14200'(890')-2.6 NM
B	
C	
D	

A  
B  
C  
D

A	14200'(890')-2.6 NM
B	
C	
D	

A  
B  
C  
D

A	NA
B	
C	
D	

Functioning VASI lights required for night landings.

MAP of LMM

CHANGES: Visibilities.

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Eastern Air Lines

JUL 9-82 (16-8)

LA PAZ Approach-See first opch chart for freq.

LA PAZ Tower 118.3

Ground 121.9

LA PAZ, BOLIVIA

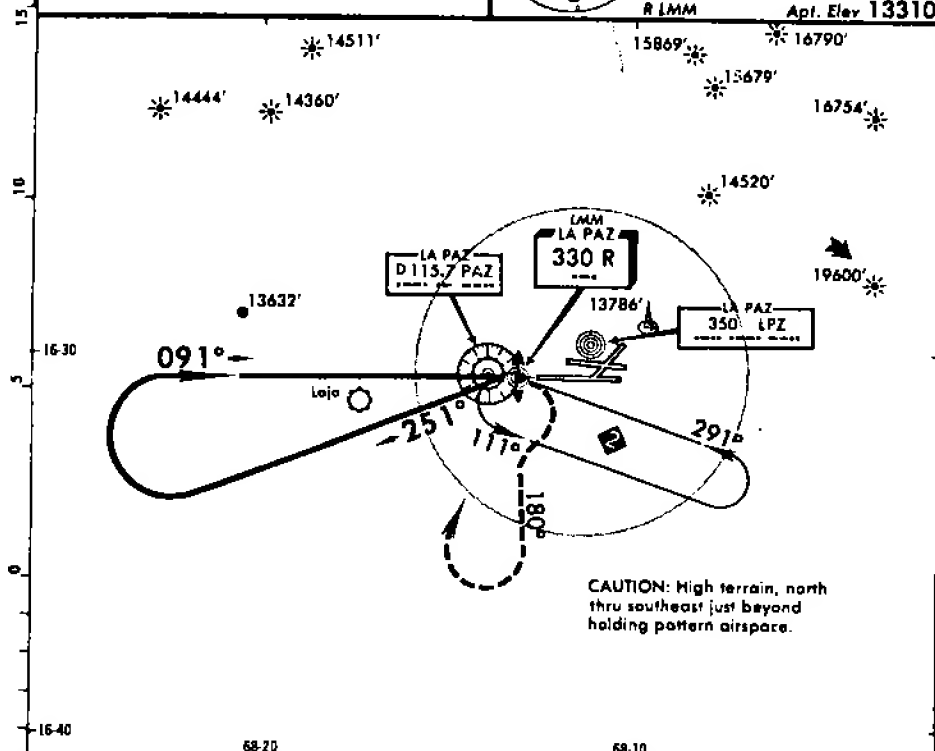
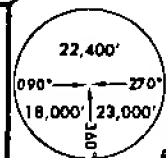
KENNEDY INT'L

NDB-2 Rwy 09R

NDB 330 R

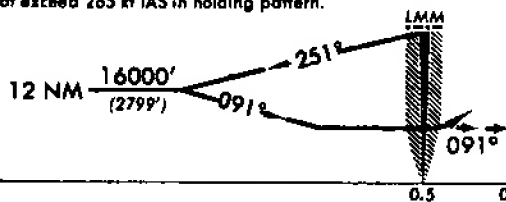
Class LMM

Apt. Elev 13310'



NOTE: Maintain MEA, MOCA or higher until over R LMM. Do not exceed 265 kt IAS in holding pattern.

Altimeter Setting in MILLIBARS (INCHES on Request)



TRANS LEVEL BY ATC  
TRANS ALT: 18000'(4799')

MISSED APPROACH: Climbing RIGHT turn to 16000' on 180° then RIGHT to 18000' direct R LMM and hold.

STRAIGHT-IN LANDING RWY 09R

MDA 13900'(699')

CIRCLE-TO-LAND

NA North of Rwy 09R 27L  
Centerline Extended

DAY

NIGHT

A  
B  
C  
D

1.5 NM

A  
B  
C  
D

14200'(890')-2.6 NM

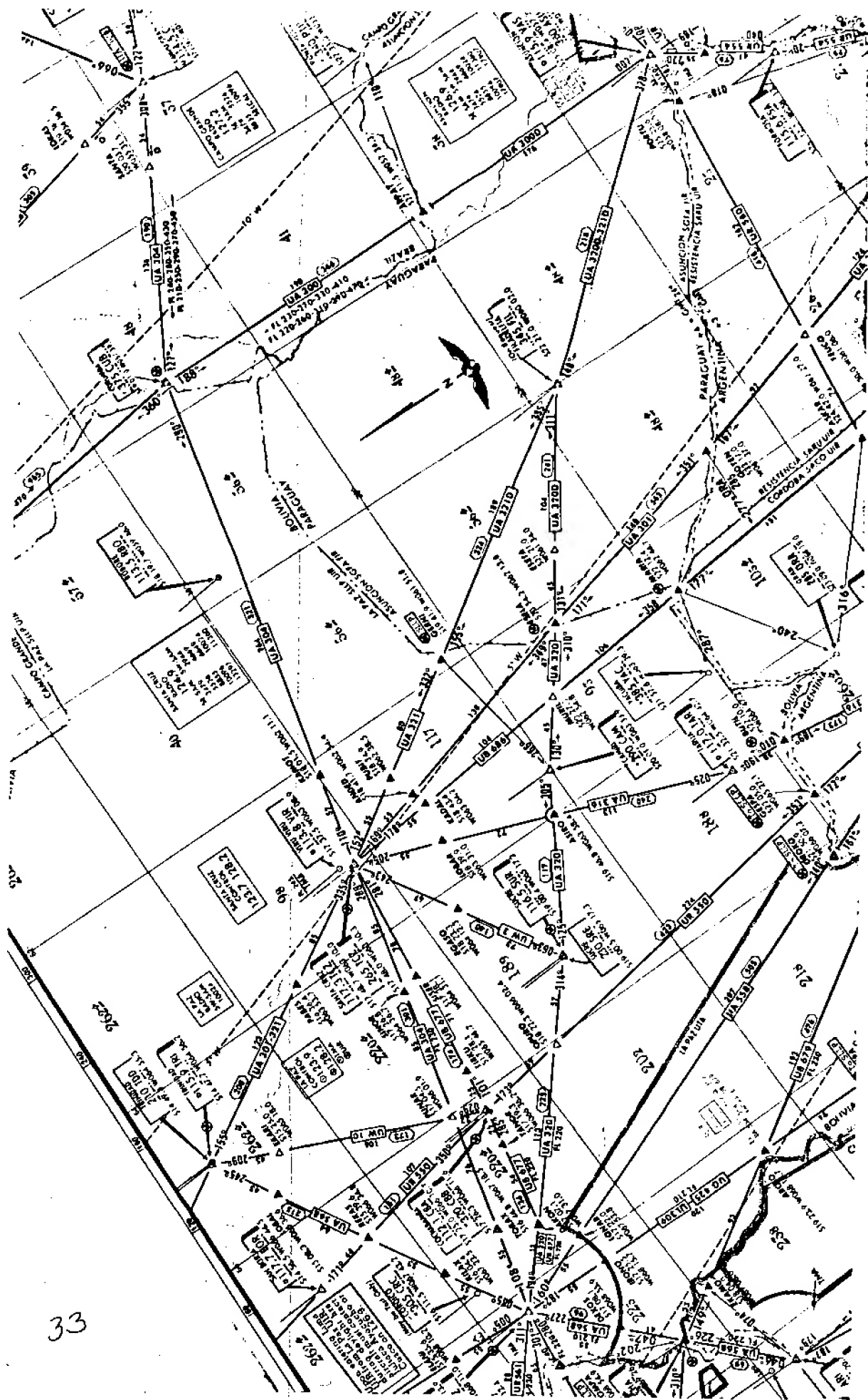
NA

Functioning VASI lights required for night landings.

MAP at LMM

CHANGES: Visibilities.

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when other cockpit duties do not permit. This procedure will enable both pilots to be aware of the aircraft configuration at all times.

#### **H. Enroute Climb**

Normal climb thrust for the appropriate engine rating and climb schedule speed shall be maintained until desired Mach is reached at cruise altitude.

#### **J. Computer Flight Plan**

The computer flight plan takes into consideration all of the factors (aircraft and engine performance, wind, temperature, payload, etc.) to select the most economical altitude for the gross weight. It should be flown as planned unless weather or passenger comfort dictate a change.

#### **K. Cruise**

1. Optimum altitude is defined as that altitude which will produce the most miles per pound of fuel. A flight should be conducted within 2,000 feet of optimum, and a step climb should be used if indicated on the computer flight plan. 2,000 feet above optimum allows the aircraft to fly into optimum altitude as the gross weight decreases. A step climb should not be used when within 300 miles of the destination. The crew should consult the Aircraft Performance and Planning Manual to confirm the optimum altitude with the computer flight plan, or to revise the altitude if the gross weight is different.

2. Buffet altitude, like optimum altitude, varies with weight. Although 1.5G buffet protection is the margin most commonly used, Eastern policy allows a reduction of that margin based on forecast and/or actual cruise conditions.

3. After reaching the cruise altitude and the desired cruise indicated airspeed, set cruise thrust. Make small power changes to maintain the desired cruise indicated air speed/Mach as the aircraft weight is reduced. This is the flight regime where significant fuel economy is achieved, so avoid the temptation to "let it roll".

#### **L. Approach Briefing**

Prior to each approach, IFR or VFR, the approach briefing will consist of a review of the appropriate plate to include the following:

##### **1. Crossing Altitude**

- a. On an ILS approach, it will be the altitude where the approach crosses the outer marker or a selected appropriate point if depicted on the approach chart (e.g. a charted intersection, a DME fix or a radar fix).
- b. On a non-precision approach, it will be the altitude when the approach crosses the FAF, or a selected appropriate point if depicted on the approach chart (e.g. a DME fix).

The crossing altitude shall be expressed as above field level (AFL). At stations where QFE is

not used, the crossing altitude shall be expressed as MSL. Crosscheck all altimeters (QFE against QNH).

2. Minimum altitude (decision altitude, decision height or minimum descent altitude).
3. Missed approach point, if applicable.
4. Initial missed approach sections consisting of:
  - a. Initial heading
  - b. Initial altitude

It is recommended the approach plate be made available to the Second Officer so he can review the approach procedure and be alert for deviations during the approach.

#### **M. Altitude Awareness Callouts**

1. During climb and descent, the pilot flying the aircraft will call out the altitude when passing through the last 1,000 feet prior to reaching the assigned altitude.
2. During climb and descent the pilot flying the aircraft will call transition altitude, and altimeters will be reset at that time.
3. During approach, the following callouts will be made by the pilot flying the aircraft:
  - a. Instrument approach (IFR conditions)

#### **1) Crossing Altitude**

- a) On an ILS approach, it will be the altitude where the approach crosses the outer marker or a selected appropriate point depicted on the approach chart (e.g. a charted intersection, a DME fix or a radar fix).
- b) On a non-precision approach, it will be the altitude where the approach crosses the FAF or a selected appropriate point depicted on the approach chart (e.g. a DME fix).

The crossing altitude shall be expressed above field level (AFL). At stations where QFE is not used, it shall be expressed as MSL.

- 2) 1,000 feet above the field. Any significant deviation from glide path or MDA below 1,000 feet should be called out. Immediate corrective action will be taken or the approach will be abandoned.
- 3) 100 feet above minimum altitude (DH, DA, or MDA). If DH/DA is based on a radio altitude, the callout will be made with reference to the radio altimeter. If the aircraft is equipped with an aural radio altimeter signal, this callout is not required.



## FLIGHT OPERATIONS MANUAL - VOLUME 1

4) Minimum altitude (DH, DA or MDA).

b. VFR approach with or without the use of approach aids.

A callout will be made at 1,000 feet above field level or at the altitude when the terrain warning signal is cancelled, whichever occurs first.

**NOTE:** On nonprecision approaches in IFR conditions, the Second Officer will callout approaching 100 feet above field level. On all other approaches he will serve as an additional backup for all callouts. Below 1,000 feet he becomes a more active participant in the approach, observing and crosschecking flight instruments until the rollout is complete. However, visual cues on an instrument approach such as ground contact, approach lights, etc. should only be called out by the pilot (Captain or First Officer) not flying the aircraft.

4. The pilot not flying the aircraft shall verbally acknowledge all callouts, and he shall cancel the terrain warning when appropriate. The Second Officer shall serve as a backup. Any crew member should challenge the absence of any callout.

### N. Touchdown Point

1. The desired touchdown point for landing is:

a. 1,000 feet down the runway for DC-8 and B-727.

b. 1,500 down the runway for L-1011, A-300, and B-757.

2. The acceptable touchdown zone is plus or minus 500 feet from the desired touchdown point.

### P. After Landing Checklist

The "After Landing Checklist" items will not be accomplished until after the aircraft has cleared the runway, unless specifically called for by the Captain.

### Q. Cockpit Distraction During Critical Phases of Flight

Crew members are prohibited from performing any duties during a critical phase of flight except those duties necessary for safe operation of the aircraft. No flight crew member may engage in, nor may any Captain permit, any activity during a critical phase of flight which could distract any flight crew member from the performance of his or her duties, or which could interfere in any way with the proper conduct of those duties.

1. Critical phases of flight include all ground operations involving taxi (defined as movement of an aircraft under its own power on the surface of an airport), takeoff, landing, and all other flight operations conducted below 10,000 feet, except cruise flight.

2. Specific activities prohibited during critical phases of flight include:

a. Radio calls for non safety related purposes such as order-





**EASTERN**

**FLIGHT OPERATIONS MANUAL - VOLUME 1**

ing galley supplies and confirming passenger connections.

- b. Announcements to the passengers promoting the Company or pointing out sights of interest.
  - c. Paperwork unrelated to the safe operation of the flight.
  - d. Eating meals.
  - e. Nonessential conversation within the cockpit, and nonessential communication between the cockpit and flight attendants.
  - f. Reading publications not related to the proper operation of the flight.
3. PA announcements from the flight crew, or cockpit entry by the flight attendants, which are not safety related are permitted during ground holding in designated areas, such as a queue awaiting takeoff, at a "penalty box" waiting for a gate, or in a glycol area waiting to be de-iced.
4. Cockpit Contact

Below 10,000 feet, flight attendants should not contact the cockpit except for items which could affect the safety of flight. It is recommended that the flight crew advise the flight attendants when the Aircraft is above 10,000 feet on climbout. The flight attendants may assume the Aircraft is above 10,000 feet ten minutes after takeoff. The flight crew should also advise the flight attendants prior to

reaching 10,000 feet during descent. The flight attendants may assume that the aircraft is below 10,000 feet when the "fasten seat belt" announcement is made after the start of descent.

**R. Oxygen Requirements**

**1. Aircraft requirements**

All Eastern aircraft are equipped with sufficient oxygen dispensing equipment for all flight operations. This includes both supplemental and first aid oxygen.

**2. Flight crew requirements**

- a. At FL 250 and below, oxygen masks must be available for use.
- b. Above FL 250, up to and including FL 410:
  - 1) The quick don oxygen mask must be in its quick release holder, readily available for use.
  - 1) If it is necessary for the Captain or First Officer to leave his duty station, the other pilot shall wear his mask and use oxygen until the absent pilot has returned to his duty station.
- c. Above FL 410 one pilot must wear and use his oxygen mask.
- d. La Paz (LPB) operation

Operations at La Paz require the wear and use of the oxygen



**EASTERN**

**FLIGHT OPERATIONS MANUAL - VOLUME 1**

mask when the cabin altitude reaches 10,000 feet on descent until the aircraft is secure at the gate. Flight crew members at La Paz will don their oxygen masks prior to accomplishing the "Before Starting Engines Checklist" and will continue to use oxygen until the cabin altitude is below 10,000 feet after takeoff.

**S. No Control Tower**

When operating to or from an airport with no control tower, the following important items should be considered:

1. Inoperative lighting components may require higher weather minimums for both landing and take-off.
2. Unless reported by a tower, RVR may not be used by a pilot to determine legal minimums.
3. Altimeter setting procedures may vary, resulting in higher minimums.
4. Unmonitored NAVAIDS may significantly alter the weather minimums if the particular airport is used as an alternate.
5. Reports of local traffic activity must be obtained through FSS or Company Radio (if available). These communications requirements do not apply to charter operations or foreign operations.
6. Pilot controlled lighting may be available; see Jeppesen charts or Company NOTAMS.

7. Broadcasts in the blind concerning your position and intentions are recommended and expected.
8. A listening watch for other traffic is recommended and expected.
9. Consult the Jeppesen charts and/or Company NOTAMS for any other effect no control tower may have on airport minimums or normal airport operations.

**T. Omega Operating Procedures**

The following procedures apply whenever the Omega Navigation System is used.

1. Either pilot may accomplish system initialization and waypoint entry, however accuracy of the entries shall be checked by the pilot not inserting the data.
2. Waypoint location (latitude and longitude) may be obtained from the computer flight plan or from Jeppesen charts.
3. When the waypoints are inserted, the accuracy of the entry shall be checked by comparison of the remote range distances on the ONS against the leg distances shown on the computer flight plan or Jeppesen charts.
4. The first two waypoints should, where possible, be selected so that the accuracy of the ONS can be confirmed by another means of navigation.
5. Position information should be checked for accuracy in order to verify the reliability of the ONS as

a means of navigation. Aircraft position should also be checked for accuracy at the following times.

- a. Prior to a compulsory reporting point when operating IFR and the flight is not under positive radar control.

- b. When approaching each enroute waypoint.

When the flight is within approximately two minutes of a waypoint the following procedure should be used.

- 1) Both pilots should verify that the currently displayed position agrees with the planned aircraft position.

- 2) Both pilots should verify that the next subsequent waypoint agrees with the flight plan and ATC clearance under which the flight is operating.

- c. After passing each enroute waypoint.

Within several minutes after passing each waypoint, the following procedures should be used.

- 1) Confirm that the ONS has properly switched to the next track segment.

- 2) Confirm that the aircraft is properly tracking the new course if the autopilot is being used.

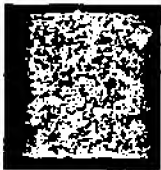
- d. At hourly intervals when operating off approved Omega routes.

6. A how-goes-it record should be maintained for ETA, ATA, fuel burnoff, and fuel remaining so that the crew has a backup means of navigation should the Omega fail.

7. If the Omega degrades to less than a 02 status, navigation of the aircraft will be accomplished by means of VOR or ADF until the Omega again becomes reliable and is properly updated. If no reliable VOR or ADF signal is available, the flight plan will be flown until a valid signal is received.

8. The Captain is responsible for reviewing and applying Omega NOTAMs. Omega NOTAMs are broadcast on WWV and WWVH (HF frequencies 2.5, 5.0, 10.0, 15.0, and 20.0 MHz) at 16 and 46 minutes past each hour.

9. Omega is to be used as means of enroute navigation only. The system is not intended to be used for navigation in terminal areas for either approaches or departures. It is also not to be used for navigation when operating below the Minimum Enroute Altitude.



## EXCERPTS

## Administrative BULLETIN

#B2-3

EASTERN

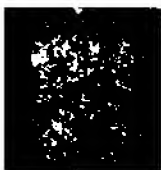
FLIGHT OPERATIONS

TO: All Captains, First and Second Officers ,  
SUBJECT: Latin American Operations  
DATE: May 14, 1982

### I. GENERAL

The following bits and pieces of information have been selected as pertinent and necessary for beginning our service to Latin America. Be aware that Eastern services and facilities for Latin American operations are being provided and placed as rapidly as possible; that our knowledge of facilities and procedures is being updated minute by minute. This Administrative Bulletin is an attempt to provide all information possible pertaining to Flying Operations with the understanding that some items will be changed or out-of-date before you read this.

Flight crews are enjoined to use information provided herein as guideline and to revert to previous Braniff procedures as provided by our Latin American station personnel when difficulties and conflicts occur. We must recognize that our Latin American employees, transferred from Braniff, are highly qualified and experienced while we are newcomers just getting acquainted with facilities and procedures unique to the various countries to which and over which we will fly. Eastern flight crews are accustomed to a rather complete set of services and procedures of which not all can be provided in Latin America. Our beginning operations there will require the utmost in alert, heads-up flying, good judgement, and diplomacy in our communications with Latin American personnel.



## II. FLIGHT PREPARATIONS

1. Domestic - Gateway Departure. Flights departing domestic gateway stations for Latin American destinations will be provided full Eastern departure services as are normally provided all domestic flights. In addition, flight crews will be given an International Weather Flight Folder produced by the National Weather Service. The exceptions will be flights terminating at PTY, BAQ, CCS, and MAR and not proceeding to another Latin American destination. Such flights to PTY, BAQ, CCS, and MAR will receive normal Eastern tailored weather information at their gateway. All other flights to Latin America will require International Flight Folders to fulfill FAR requirements. Some South American weather information will appear in your Eastern documentation, but the NWS International Flight Folder is primary and required with the only exceptions listed above.

Your flight will be filed and cleared on a single specified route as indicated in the Dispatch Release and by the Computer Flight Plan. This will be the case for all Eastern flights to, in and from Latin America, at least for the time being. The only deviations from the filed route will be for an emergency, severe weather avoidance, or when directed by Air Traffic Services. International Flight Rules must be observed and ICAO Flight Plans must be used. Please review pages 3-5-11 through 3-5-15 F.O.M. Vol. I.

Note that routing from the New York area is over MTH and thence via the GIRON corridor. This is a required route but may possibly require deviation around Cuba if an individual flight is denied permission to overfly Cuba.

2. Latin America. A version of "mini" Flight Departure Papers (FDP) will be used. The Dispatch Release will be sent by separate message and will not be included in FDP. Note that the Flight Log is not included in FDP: all flight crews should carry their bid sheets. Stored Flight Plan information has also been deleted since there will be CFPs provided for all flights and copies of flight plans will be kept at Latin American Operations offices. MEL's, crew names, and Latin American NOTAMS will constitute FDP for flights

within and departing Latin America. The abbreviation "SOB" appearing on South America NOTAMS stands for "South of the Border." A CFP will be provided (sent) to each flight at each departure station. It is possible that some difficulties with CFP format and readability may be encountered at stations where low-speed teletype relay must be used. ICAO International Flight Folders provided at station operations fulfill weather requirements. Weather reports (sequences) will be provided (and interpreted when necessary) by station personnel. Latin American weather will appear in International ICAO codes for the most part: please review these codes on pages 5-3-11 thru 5-3-15 of F.O.M. Vol. I.

Latin American station agents are being trained in manual preparation of Eastern weight and balance procedures and the Load Manifest: Automated Weight and Balance (AWAB) will not be available. One and only one route will be used for each city pair to, in, and from Latin America at the present time. Eastern's CFP system will be limited to this one preferred route as listed below, but pilots should remain alert for future changes in these preferred routings.

Although Flight Plans will be given in advance to the Latin American Air Traffic Authorities (the equivalent of stored Flight Plans), flight crews must insure that ICAO flight plans are manually filed for each flight. Trained and experienced station agents will accomplish forms, provide local "know how" and send flight plans to ATS.

Note that Omega, while desirable, is not required for any route to, in, or from Latin America since our Operations Specifications are predicated on VOR/ADF navigation.

### III. ENROUTE

#### 1. Air-Ground Communications

On or about June 1, 1982 all Latin American stations will have company in-range radios tuned to 130.7 MHz with the exception of Buenos Aires which will operate on 131.5 MHz. Prior to June 1, in-range frequencies are as listed below.

A/G VHF FREQUENCIES

BUE (EZE)	131.5 MHz
ASU	130.3 MHz.
SCL	130.4 MHz
LPB	130.0 MHz
LIM	131.2 MHz
RIO	131.6 MHz
SAO	131.6 MHz
GYE	131.5 MHz
UIO	131.5 MHz
CLO	131.2 MHz
BOG	131.5 MHz
PTY	130.3 MHz

In-range radio procedures are similar to domestic Eastern procedures but expect terrain signal blockage in some areas. Use in-range VHF radio to report 0001 times, for maintenance, and all Company messages. QNH altimeter procedures (settings) will be utilized at all Latin American stations. Pilots are cautioned to study charts and plates for the various transition altitudes (QNH) and also minimum crossing altitudes and airspeed restrictions during descents.

Primary Company traffic will utilize the HF radio center at Lima which is being transferred from Braniff. "Eastern Lima Radio" must be monitored at all times on frequency 11215 KHz with back up on 15015KHz and 6655KHz. 0001 times, position reports, delays, problems, etc. should be reported to Eastern Lima Radio as well as the appropriate in-range station. It is expected that Eastern Lima Radio will have both SELCAL and phone patch capability by 1 June 1982. Some in-range radios are also expected to have phone patch capability. Position reports, required at all compulsory reporting points and at least each 90 minutes, must be called to Lima radio and the appropriate Air Traffic System radio. Lima radio will relay position reports to ATC when flights are unable to contact ATC. Remember that Air Traffic Services in South America will not pass position reports or traffic beyond their particular country. Lima Company Radio is expected to have Codacom terminal equipment installed by June 1, 1982 so that company radio traffic can be entered into Eastern's computerized system.

IV. NAVIGATION

Previous Latin American operators have found that use of airborne weather radar for terrain identification is of great value on some routes. Mountain peaks and high ranges are easily identifiable.

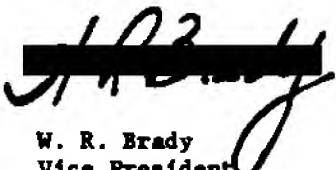
V. AIRPORT INITIAL ENTRY REQUIREMENT

A Check Airman will accompany the Captain on his initial airport entry into the South American system beyond Panama City.

In addition to the above, a Check Airman will be required to occupy the right seat during the Captain's initial entry into Bogota, Quito and La Paz.

VI. LAST MINUTE INFORMATION AT PRESS TIME

- o There is a possibility of using the A-300 on LPB sequences until B-727B equipment becomes available approximately June 1, 1982.
- o PTY will be overflown on Latin American flights until legal permission to serve PTY is received.

  
W. R. Brady  
Vice President  
Flying Operations and  
Safety

WRB:bmp



# Administrative BULLETIN

#82-4

## EASTERN FLIGHT OPERATIONS

TO: All Captains, First and Second Officers

SUBJECT: Latin/South American Operations

DATE: July 1, 1982

### I. GENERAL

This is the second Administrative Bulletin on the subject and supersedes Administrative Bulletin 82-3. Significant to a safe, effective operation is alertness, adaptability, patience, and an occasional dose of pilot type skepticism when it comes to dependence on the many services considered routine in domestic flying. Continual up-to-date information will be provided but be aware that changes are imminent. Stay alert. HF is not quite as reliable as VHF. Individual countries have differing procedures and requirements that are subject to change; weather reporting formats differ and some changes do not reach Miami in as timely a fashion as we are used to.

Our experience thus far indicates that the Eastern station personnel are our best guides when in-country problems arise. They are experienced, professional, and have the contacts to get things accomplished. Our crews confirm that professional bearing, dress and attitude are of great importance. Our conversation and in particular our announcements are always taken as expressions of Eastern Airlines. A case-in-point--when flying into La Paz do not discuss the "altitude problem" in your announcement. State the facts in a very tactful manner. The Bolivian Government is very sensitive about this subject.

### II. COMMUNICATIONS

#### A. In-range

Eastern in-range VHF radios at GYE, SCL, LIM, PTY, and BAQ are now operating on 130.7 MHz. LIM has VHF SELCAL capability. UIO, BOG, EZE in-range radios are operating on 131.5 MHz while awaiting license to operate on 130.7 MHz. LPB is operating

on 130.0 MHz awaiting license to operate on 130.7 MHz. ASU is operating on 130.3 MHz and will be converted to 130.7 MHz in the near future. CLO is assigned frequency of 131.2 MHz but is currently inoperative due to landline-remote site problems; permission and license to move the site and change frequency to 130.7 MHz have been granted. NOTAM's will be issued to advise of frequency changes as they occur.

**B. Enroute Services**

Eastern Atlanta Radio extended range stations on KIN and GCM are in operation on 130.7 MHz providing VHF communications on all routes North of the Panama and Barranquilla FIR's.

New HF radio equipment has been installed at Eastern Lima Radio including SELCAL capability. The primary frequency is 11215 KHz with back up on 15015 KHz (day) and 6555 KHz (night). Eastern Lima Radio should be monitored at all times and used for position reports and 000I reports. These reports should be given both to Lima Radio on HF and to the appropriate in-range radio on VHF.

Eastern has applied for permission to operate an HF radio station at Atlanta with a complete family of frequencies for both air-ground and ground to ground communications. Permission to change Mexican in-range radio frequencies to 130.7 MHz has also been requested in order to give VHF enroute coverage on this single frequency between U. S. and Latin America North of Panama and Barranquilla FIR's.

Remember that Air Traffic Services (ATS) required position reports must be made directly to ATS on published frequencies and that ATS does not necessarily forward these reports ahead. Therefore, you should call ahead with estimates, especially for FIR penetrations. Company position reports must be made every ten degrees of latitude or longitude, but not less often than every ninety minutes. Where ATS does not have VHF coverage, flights are responsible to monitor the appropriate ATS HF frequency. It is strongly recommended that position reports and estimates also be broadcast to other aircraft, in the blind, on 126.9 MHz

### III. FLIGHT PREPARATIONS

1. Domestic-Gateway Departure. Flights departing domestic gateway stations for Latin American destinations will be provided full Eastern departure services as are normally furnished to all domestic flights. In addition, flight crews will be given an International Weather Flight Folder produced by the National Weather Service. The exceptions will be flights terminating at PTY and BAQ and not proceeding to another Latin or South American destination. Such flights to PTY and BAQ will receive Eastern tailored weather information at their gateway. All other flights will require International Flight Folders to fulfill FAR requirements. Some South American weather information will appear in your Eastern documentation, but the NWS International Flight Folder is primary and required with the only exceptions listed above.

Your flight should be filed and cleared on a single specified route as indicated in the Dispatch Release and by the Computer Flight Plan. This will be the case for all Eastern flights to, in and from Latin and South America. The only deviations from the filed route will be for an emergency, severe weather avoidance, or when directed by Air Traffic Services. Be aware that many job classifications in Latin and South America are termed "Dispatcher" but they are not licensed by FAA and may not be familiar with our requirements. International Flight Rules must be observed and ICAO Flight Plans must be used. Please review pages 3-5-11 through 3-5-15 F.O.M. Vol. I.

2. Latin/South America. A version of "mini" Flight Departure Papers (FDP) will be used. The Dispatch Release will be sent by separate message and will not be included in FDP. Note that the Flight Log is not included in FDP; therefore, all flight crews should carry their bid sheets for scheduled departure and arrival time information. Eastern routes south of Bogota to Lima will be restricted to UA-5 and those airways to the west. The reason for this is the high MEA's east of UA-5 and the additional distance to the west coast alternates to be used in the event of engine or pressurization problems. MEL's, crew names, and Latin American NOTAMS will constitute FDP for flights within and departing Latin/South America. The abbreviation "SOB" appearing on South America NOTAMS stands for "South of the Border" and is used to identify Latin/South America

NOTAMS info of a "General" nature. Station NOTAMS will be found under their 3-letter identifier. A CFP will be provided (sent) to each flight at each departure station. ICAO International Flight Folders provided at station operations fulfill weather requirements. Weather reports (sequences) will be provided (and interpreted when necessary) by station personnel. Latin/South American weather will appear in International ICAO codes for the most part: please review these codes on pages 5-3-11 thru 5-3-15 of F.O.M. Vol. I.

Latin American station agents are being trained in manual preparation of Eastern weight and balance procedures and the Load Manifest: Automated Weight and Balance (AWAB) will not be available in the immediate future. One and only one route will be used for each city pair to, in, and from Latin/South America. Eastern's CFP system will be limited to this one preferred route. Pilots should insure that both the CFP and filed routes are in agreement prior to departure. Please notify Eastern Dispatch immediately anytime you are routed around Cuba.

Although Flight Plans will be given in advance to the Latin/South American Air Traffic Authorities (the equivalent of stored Flight Plans), flight crews must insure that ICAO flight plans are manually filed for each flight. Trained and experienced station agents will accomplish forms, provide local "know how" and send flight plans to ATS.

Note that Omega, while desirable, is not required for any route to, in, or from Latin/South America since our Operations Specifications are predicated on VOR/ADF navigation.

#### IV. AIRPORT INITIAL ENTRY REQUIREMENT

A Check Airman will accompany the Captain on his initial airport entry into the Latin/South American system except Panama City and BAQ.

In addition to the above, a Check Airman will be required to occupy the right seat during the Captain's initial entry into Bogota, Quito and La Paz.

V. ROUTE/ALTERNATES FOR LATIN AMERICA MOUNTAINOUS TERRAIN OPERATION

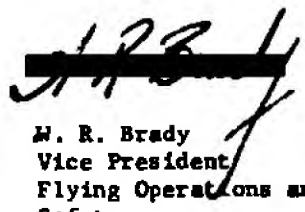
ROUTE/SEGMENT	AIRCRAFT	AUTHORIZED AIRWAYS	PREFERRED DRIFT DOWN ALTERNATES
Bogota-Quito	L-1011/727	UA-5 and West	CLO, PTY
Quito-Lima	L-1011/727	UA-5 and West	GYE, TYL, CIX, LIM
Lima-La Paz	727-225B	UB-14/UA-27 UA-1 /UA-41	LIM, SCO, ARI LIM, SCO, ARI
La Paz-Asuncion	727-225B	UA-43	LPB, ASU, JUJ, RES, CNQ
Lima-Santiago	L-1011/727	UA-1 and West	LIM, SCO, ANF, SCL
Santiago-Buenos Aires	L-1011/727	UG-15	SCL, CCP, EZE
Buenos Aires-Santiago	L-1011/727	UW-9	EZE, ODB, MDZ, UAQ, SCL

CLO	Cali	CCP	Concepcion
PTY	Panama City	EZE	Buenos Aires
GYE	Guayaquil	ODB	Cordoba
TYL	Talara	MDZ	Mendoza
CIX	Chiclayo	UAQ	San Juan
LIM	Lima		
SCO	Pisco		
ARI	Arica		
LPB	La Paz		
ASU	Asuncion		
JUJ	Jujuy		
RES	Resistencia		
CNQ	Corrientes		
ANF	Antofagasta		
SCL	Santiago		

VI. OPERATIONAL TIPS

- . Accident statistics and reports show that wet runways pose a special problem. There is no criteria for reporting the amount of water on a runway in Latin/South America. Towers will not communicate amount of rain or present conditions unless asked. Some South American airlines recommend waiting for showers to pass. Many Latin/South American runways have been reported as extremely slippery when wet.
- . Controllers are generally not familiar with aircraft performance. Some airlines have experienced difficulties in complying with climbs/letdowns and speeds requested. It is suggested that pilots politely request desired speeds and inform of limitations as necessary.
- . Previous operators have reported close calls on direct flights. Note that there is no traffic control in blue tinted areas on Jeppesen charts.
- . Personal security measures should be exercised at layover stations.
- . Don't take anything for granted--question any transmissions not completely understood.
- . Previous Latin American operators have found that use of airborne weather radar for terrain identification is of great value on some routes. Mountain peaks and high ranges are easily identifiable.
- . Make all turns at standard rate at high altitude airports. High radius turns in combination with high TAS may result in reduced obstacle clearance.
- . If unable to receive a lower altitude in preparation for descent due to conflicting traffic (or ascent on departure) request descent (or climb) through the altitude in question VMC, provided visual meteorological conditions actually exist. (This is not normally permitted in U. S. controlled airspace).
- . Unlike ATC in U.S., ATS may not provide descent clearance until asked. It is suggested that you advise them as soon as you know when you want to start down.

- . Suggest use of maximum rate of climb whenever a high MEA or crossing fix altitude is required.
- . Use standard and complete phraseology--no slang or excessive verbage in radio transmissions.
- . CFP winds for Latin/South American routes will not be as reliable as those in U. S. They are based on a 30-hour forecast made from fewer observations due to vast ocean area.
- . VFR traffic is heavy in many areas and ATS will often not advise of traffic unless asked.
- . Flight crews are requested to advise Miami Dispatch any discrepancies/problems that have not previously been carried in Bulletins or NOTAMS.

  
W. R. Brady  
Vice President  
Flying Operations and  
Safety

WRB:bmp

# EASTERN

*Rodriguez*

## CHECK AIRMAN BRIEFING SUPPLEMENT

### KENNEDY INTERNATIONAL AIRPORT LA PAZ, BOLIVIA LPB/SLP

This document has been generated to supplement the SPECIAL AIRPORT QUALIFICATION form for La Paz, Bolivia. It provides expanded information for many of the items on the qualification form.

Prerequisites prior to entry: Each crewmember will familiarize himself with the following:

#### PART VIDEO TAPE

- F.O.M. VOLUME II - Enroute charts SA(HI) 1/2, SA(LO) 7/8
- Eastern information page 1
  - Jeppesen approach charts LPB
  - SIDs/Departure procedures
  - Engine out departure procedures
  - Consult the Introduction, Chart Notams, Avigation Charts, Approach Charts sections for additional information, definitions, and format descriptions. Note Approach Charts GRADIENT TO RATE TABLE.

#### B-727 AFM

#### TAKEOFF GROSS WEIGHTS MANUAL

#### PERFORMANCE AND PLANNING MANUAL

Recommendations prior to entry: Each crewmember should familiarize himself with the following:

- VIDEO TAPES
- Takeoff Test-B727 (#203, 15 min.)
  - Landing Illusions (#506, 10 min.)

#### FLYING OPERATIONS BULLETINS

- High Altitude Airport Operations (1-31-80)
- High Altitude Holding (7-15-78)



## APPROACH AND LANDING

1. Operation at La Paz requires the use of crew oxygen. Prior to the cabin pressure altitude reaching 10,000', the crewmembers will don and use their Oxygen masks and remain on Oxygen until the completion of the Securing Check List. Passenger Oxygen mask deployment occurs at 15,000' +/- 500' cabin pressure altitude. Therefore, it is imperative that the second officer closely adheres to the appropriate pressurization procedures in the AFM as they relate to this operation.
2. Indicated airspeed versus true airspeed normally does not present a problem at the lower elevation airports with which we have become accustomed. La Paz, however, presents a different situation. The High Altitude Airport Operations Bulletin provides a ready reference and comparative data that relates directly to the subjects of true airspeed and radius of turns. All turns shall be made at 25° to 30° of bank unless specific performance requirements dictate otherwise.
3. Landing Visual Cues- Terrain, runway characteristics, prevailing visibility, runway and area lighting, and deviations from the desired visual glide path can affect the pilot's judgement.
  - An upslope on either the runway or approach zone creates an "above glide path" illusion. (Rwy 09 R 1.6% up-slope) Actual height is lower than it appears to be.
  - A downslope on either the approach zone or runway creates a "below the glide path" illusion. (Rwy 27 L 1.6% down-slope) Actual height is greater than it appears.
  - Under conditions of smoke, dust, glare, or darkness, expect to appear higher than you actually are.
  - Bright runway lights appear closer while dim runway lights appear farther away.
  - Expect to appear higher than actual when approaching a wide runway and lower than actual when approaching a narrow runway.
  - Be alert for depth perception problems on snow covered runways or when runway color approximates that of the surrounding terrain.

Illusions and their effects can be minimized by verifying the approach glidepath with cockpit instrumentation and cross checks with other crewmembers.

4. Approach/Landing Cautions:

- VASI does not necessarily provide obstacle clearance over hilly or mountainous terrain.
- Do not "duck under" an established glide path to achieve an early touchdown.(8 foot to 10 foot drop at threshold Rwy 27L)
- Be conscience of high terrain north through southeast when executing a missed approach from Rwy 09 R.

5. Flare and Touchdown/Stopping:

- Avoid prolonging the flare such that the aircraft touches down beyond the 1,500' point.
- Aircraft deceleration during flare is only 1/3 or less than that which can be achieved on the ground. High altitude airports i.e. La Paz, magnifies the IAS/TAS disparity problem.
- A firm touchdown helps prevent an extended flare and promotes prompt wheel spin up.
- Holding the nose up after touchdown degrades both braking and directional control capability and does not improve airplane stopping.
- Once the airplane has been landed (speed brake and/or reversers deployed), attempting a go around is not recommended.
- Prompt and effective utilization of all the stopping devices helps minimize the rollout distance.
- Thrust reverse is most effective at high speeds, yet some retardation force remains even at low speeds.
- Braking may be initiated as soon as the spoilers are up and runway tracking is established.
- Smoothly apply symetrical braking and hold steady moderate to firm pedal effort until a safe stop is assured.
- Be alert to areas of low friction particularly in the touchdown zone at either end of the runway and when the runway is wet.
- When landing on slippery runways it is recommended that wheel braking be initiated promptly--right after spoilers are up and runway tracking is established. If a need for maximum braking arises, the brakes should be fully applied. If a need for maximum directional control arises, the brakes should be released until directional control is regained, then reapplied as required.

- Cycling or pumping the brake pedals in an effort to "beat the anti-skid system" alternately causes excessive wheel skidding and prolonged brake release which impairs both the braking and cornering effectiveness.
- The auto brake system can be of significant value during slippery runway operations.

Notwithstanding the above stopping procedures, proper attention to tire and brake energy limits is important. (For La Paz the minimum ground time after landing is 44 minutes. Reference AFM page L-2-2 ) Maintaining runway safety margins requires a well executed approach, touchdown, and rollout. Errors that accumulate in one phase may be difficult to correct in a subsequent phase.

#### TAKEOFF AND DEPARTURE

1. Crew members will don their Oxygen mask prior to accomplishing the "Before Starting Engines" check list and will continue to use Oxygen until the cabin pressure altitude is below 10,000'. Second officers are once again cautioned of the cabin altitude and cabin pressurization requirements. Crew briefings before takeoff should be completed with respect to the but not limited to the following; departure/engine out procedures and RTO. Special attention must be paid to takeoff data such as proper EPR settings, flap settings, V speeds, wind direction and velocity, and pressure altitude/temperature corrections.
2. After initial runway alignment, airplane is held in position with the brakes set. Advance the thrust levers smoothly and evenly to 1.4 EPR. Check for symmetrical thrust and perform power plant check. Advance the thrust levers slowly and smoothly to the takeoff thrust setting, then release the brakes. Final takeoff thrust should be set prior to reaching 60 knots. The clock should be started at brake release (This will provide a means for an acceleration check to 100 knots. Performance data providing further definition of an acceleration check is forth coming.) Additionally, engine takeoff thrust time limit can be monitored.

3. Takeoff and initial climb performance is predicated on rotation at  $V_R$  and proper rate of rotation to the initial climb attitude. As the airspeed approaches  $V_R$  gradually relax forward pressure on the control column so as to arrive at  $V_R$  prepared to rotate. At  $V_R$  rotate smoothly until a stabilized climb speed of  $V_2$  plus 10 knots is achieved (all three engines operating) at approximately 35' above the runway. (Rotation rate should be approximately  $2\ 1/2^\circ$  per second).

Rotation to the proper attitude too soon may extend the takeoff roll or cause an early liftoff which will result in a lower rate of climb. Over rotation or early rotation with a nose high attitude causes increased drag, delaying acceleration to liftoff speed. Over rotation, early rotation, or rapid rotation can result in the tail skid contacting the runway.

4. Rejected takeoff (RTO) - Emphasis must be placed on the critical importance of following proper abort procedures.
  - Apply maximum brakes while simultaneously retarding the thrust levers to idle.
  - Deploy spoilers.
  - Apply full reverse thrust as soon as possible.
  - Apply slight forward pressure on the yoke (Forward of neutral).
  - Maintain full brake pedal deflection ("trying to break the tops of the pedals") and maximum reverse thrust until a safe stop is achieved. NOT SLOW--STOPPED!

Criticality of achieving maximum deceleration is clearly increased if the RTO is initiated at a speed near  $V_1$ . Maximum deceleration capability of the aircraft can only be obtained from full brake pedal application. Full brake pedal application to the stops must be continuously held for the entire deceleration period of the RTO to a stop. Full application of reverse thrust during a critical RTO should be used to a stop if necessary.

5. The subject of true airspeed and radius of turns along with the best angle and best rate climb speeds must be addressed for the departure from La Paz.  $V_2$ ,  $V_ZF$  are best angle of climb speeds provided the remaining engines are producing takeoff thrust (max bank angle-- $15^\circ$ ). The two engine/single engine enroute (obstacle clearance) climb speed, obtained from the cockpit performance chart, also is a best angle of climb speed with the remaining engines producing max continuous thrust (Max bank angle -- $30^\circ$ ).

**SPECIAL AIRPORT QUALIFICATION**

NAME	EMPLOYEE NO.	BASE	TYPE AIRCRAFT	AIRPORT La Paz
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**CATEGORY**

 INITIAL ENTRY ☐
**TYPE ENTRY**

 SPECIAL FLIGHT ☐ LINE CHECK ☐ SIMULATOR ☐

FLIGHT NO.	DATE	AIRCRAFT NO.	FLIGHT TIME	NO. LANDINGS	NAME OF CHECK AIRMAN (print)

**ENROUTE CHARTS** ☐

- MEA
- MORA
- CTA
- Controlled-Uncontrolled-Advisory-Awys/Route
- Restricted Airspace
- FIR

**APPROACH CHARTS** ☐

- Approach Plan View
- MEA
- Terrain Obstruction
- Cautions
- Profile View
- Landing Minimums
- Airport Plan View
- Additional Rny Info
- Takeoff & Alternate Mins
- Notes/Flag Notes

**SIDS DEPARTURE PROCEDURE** ☐

- Terrain Obstruction
- Fixes, Crossing Altitudes
- Minimum Climb Gradient
- Speed Restrictions

**PERFORMANCE AND PLANNING MANUAL** ☐

- Engine Failure Enroute Driftdown Procedures
- 1 Engine Inop Performance and Planning
- Apch&Lndg Climb Limits with Anti-Ice on p.3-1-384
- Landing Gross Weight Tables (P/A Adjustments)
- Certificate Limitation, Performance Adjustment, Contaminated Rnys Weight/V<sub>1</sub> Reduction&Charts-Sec.4
- Weight and Balance - Section 5

**TAKEOFF GROSS WEIGHTS MANUAL** ☐

- P/A Adjustments
- Notes Applicable to Runway
- Flap Selection

**AIRCRAFT FLIGHT MANUAL** ☐

- FIB
- Limitations
- Landing Brake Energy (Minimum Ground Time)
- Brake Cooling Schedule (RTO)

**APPROACH AND LANDING** ☐

- IAS vs TAS
- 25°-30° Bank Turns (Radius of Turns)
- Cabin Altitude
- Crew Oxygen Requirements
- Cabin Pressurization
- Airspeed Restrictions
- Landing Data
- Approach/Missed Approach Procedures
- Runway Restriction/Prohibitions
- Approach Briefing
- Visual Cues-Terrain Characteristics, Visibility and Lighting
- Touchdown Point
- Landing/Stopping
- Auto-Spoilers
- Auto-Brakes
- Anti-Skid
- Reverse

**TAKEOFF AND DEPARTURE** ☐

- Takeoff Performance (Flaps, A/C Pack On or Off, APR, EPR, V Speeds)
- Crew Oxygen Requirements
- SIDS/Departure Procedures (Briefing)
- Engine Out Procedure (Briefing)
- Acceleration Check-Time to 100 knots
- Rejected Takeoff Procedures (Briefing)
- Takeoff Data
- Rotation Rate
- Climb Performance (Best Angle/Best Rate)
- IAS vs TAS
- 25°-30° Bank Turns (15° Bank with Eng Inop)
- Radius of Turns
- Engine Acceleration Check
- Static Takeoff
- Cabin Pressurization

PART FILM VIEWED

SIGNATURE OF CHECK AIRMAN/SPVR

EMPLOYEE NO.

BASE

The Kennedy International Airport is located on a plain within the Andes Mountain Region, 13,310' MSL, about 30 NM SE of Lake Titicaca. The City of LaPaz, located NE and close to the airport, is at an elevation of 11,900' MSL. About 8 NM N and E the terrain rises rapidly to over 21,000' MSL. Lesser terrain is located to the SW. (Passenger announcements: CAUTION: See FOM Vol. 1.

### OPERATIONAL REQUIREMENTS

1. Only the B727-225B (JT8D-17R or JT8D-17 ALT 1 Performance) (equipped with 225 mph tires) authorized.
2. Review FOM Vol 1, for Crew Oxygen Requirements.
3. Only the Captain will make the takeoff and landing.
4. Circling NOT authorized North of Runway 9R-27L centerline extended.
5. Overflying City prohibited.
6. Runway 9R and 27L are the only runways authorized.
7. Runway 9R - 13,124' - 1.6% up-slope
  - Takeoff NOT authorized.
  - Functioning VASI lights required for night landing.
  - CAUTION: If executing a missed approach high terrain North thru Southeast.
8. Runway 27L - 13,124' - 1.6% down-slope
  - Landing NOT authorized at night.
  - Landing NOT authorized when wind is less than 9 knots from the West.
  - CAUTION: 8' to 10' drop at threshold runway 27L.
9. Check approach chart, approach airport chart and NOTAMS for current information.
10. Minimum ground time after landing is 44 minutes - Check AFM limitations.
11. A/C packs may be off for takeoff
  - EPR bleed corrections Eng 1 & 3 +.04.
  - Restore A/C packs after 600' AFL.
  - CAUTION: Passenger oxygen masks deployment 15,000'  $\pm$  500' cabin pressure altitude.

OPERATIONAL REQUIREMENTS (cont'd)

12. Departure and engine failure procedures must be reviewed and briefed prior to each takeoff.
13. Rolling takeoff NOT authorized.
14. 25° flap takeoff NOT authorized.
15. 40° flap landing NOT authorized.

LA PAZ TAKEOFF PROFILE

- The Captain will make all takeoffs.
- Climb to 1000' AFL (14,310' MSL) at  $V_2 + 10$ , at 1000' AFL (14,310' MSL), reduce body angle while maintaining a climb gradient, accelerate to  $V_{ZF}$  (retract flaps on schedule), at  $V_{ZF}$  set climb thrust and continue to climb at  $V_{ZF}$  to 3000' AFL (16,310' MSL), then accelerate to the best angle of climb speed.

NOTE: -Consider aircraft performance (radius of turn, TAS/GS and climb gradient) as it relates to the departure path, altitude, terrain and MEA(s).

- Retract flaps as speed permits above 400' AFL (13,710' MSL).

ENGINE INOPERATIVE TAKEOFF PROCEDURE

Climb at  $V_2$ , via PAZ VOR R-273° to 600' AFL (13,910' MSL), accelerate (retract flaps on schedule) at  $V_{ZF}$ , continue climb, via PAZ VOR R-273°, and takeoff thrust. At 1,500' AFL (14,810' MSL) or the takeoff thrust time limit, whichever occurs first, set MAX CONTINUOUS thrust and accelerate to the BEST ANGLE OF CLIMB SPEED and climb to 16,000' MSL. Execute a course reversal (gear drop to the right), then:

1. Intercept the appropriate runway 9R approach procedure,  
OR,
2. Intercept the PAZ VOR R-273° and continue to climb so as to cross the PAZ VOR at or above 18,000' MSL before continuing enroute.

# OPERATIONAL INFORMATION -

## WIND

- Anemometers are located as follows; one on top of the ATC Tower and one at the West end of Runway 27L.
- Winds issued by ATC Tower are reported from the anemometer located on top of the ATC Tower.
- Wind information from the anemometer located at the West end of Runway 27L is available upon request from ATC Tower
- Wind socks are located at the end of Runway 27L and Runway 9R.
- Wind sock will extend out horizontally when wind velocity reaches approximately 30 knots.

## AIRCRAFT WEIGHT

- All baggage and freight are weighed prior to aircraft loading.

## BEST ANGLE OF CLIMB SPEED

A BEST ANGLE OF CLIMB SPEED (KIAS) chart is provided. Speeds will be selected from this chart for a normal takeoff profile, engine out profile or any other time that maximum climb angle performance is desired.

225B

BEST ANGLE OF CLIMB SPEED (KIAS)								
G. W. 1000 LB								
PRESSURE ALT FT	120	130	140	150	160	170	180	190
S.L.	201	210	218	225	233	240	247	253
10,000	203	212	220	227	235	242	249	256
20,000	204	213	221	229	237	244	252	259
30,000	207	216	224	233	241	249	257	264

## ENGINE INOPERATIVE MISSED APPROACH PROCEDURE

Runway 9R - Climbing right turn (15° max bank angle) to 13,910' MSL (600' AFL), then via the Engine Inoperative Takeoff Procedure runway 27L.

Runway 27L - Comply with the Engine Inoperative Takeoff Procedure runway 27L.



Date: 8/1/84

LaPaz, Bolivia - LPB/SLLP

ADVISORY INFORMATION ONLY

Airport Elevation = 13,310'

Pressure Altitude = 13,304' to 13,404'

IAS	MACH	TRUE AIRSPEED VERSUS TEMPERATURE °F - °C and Departure From ISA				
		F -25	F -7	F +11	F +29	F +47
		C -31	C -21	C -11	C -1	C +9
		ISA -20	ISA -10	ISA	ISA +10	ISA +20
120	.233	141	144	147	150	152
125	.243	147	150	153	156	159
130	.252	153	156	159	162	165
135	.262	159	162	165	168	171
140	.272	165	168	171	175	178
145	.281	170	174	177	180	184
150	.291	176	180	183	187	190
155	.300	182	185	189	193	196
160	.310	188	192	195	199	203
165	.320	194	198	202	206	209
170	.329	199	203	207	211	215

ACCELERATION CHECK CHART - 8727-225B

Gross Weight - Lbs.	Time to 100 KIAS - Seconds
120,000	32
130,000	35
140,000	38
150,000	41
160,000	44
170,000	47

CORRECTIONS:

1. For 500' increase in pressure altitude - add 1 second.
2. For 10° C reduction in temperature - subtract 1 second.

- Flaps 5° and flaps 15°
- JT8D-17R Engines
- A/C off
- No slope or wind
- Pressure altitude - 12,500'
- Temperature = 20° C

Eastern Airlines - Company NOTAMS

La Paz, Bolivia

Date: January 4, 1985

UFN, WHEN APPROACHING LPB FROM ASU IN VMC OR IMC, DO NOT DESCEND BELOW FL250 TIL 20NM FROM "PAZ" VOR BEFORE EXECUTING APPROPRIATE CHARTED INSTRUMENT APPROACH PROCEDURE.

Date: January 15, 1985

UFN, WHEN APPROACHING LPB FROM ASU IN VMC OR IMC, DO NOT DESCEND BELOW FL250 TIL 20 NM FROM "PAZ" VOR BEFORE EXECUTING APPROPRIATE CHARTED INSTRUMENT APPROACH PROCEDURE. OUTBOUND FROM LPB TO ASU DO NOT DEVIATE NORTH OF "PAZ" VOR 134 DEG RADIAL UNTIL CLIMBING OUT OF FL230.

Date: April 15, 1985

UFN, WHEN APPROACHING LPB FROM EAST THRU SOUTH IN VMC OR IMC DO NOT DESCEND BELOW FL250 TIL 20 NM FROM PAZ VOR BEFORE EXECUTING APPROPRIATE CHARTED INSTRUMENT APPROACH PROCEDURE. OUTBOUND FROM LPB TO ASU DO NOT DEVIATE NORTH OF PAZ VOR 134 DEG RADIAL UNTIL CLIMBING OUT OF FL230.



**EASTERN**

**FLIGHT OPERATIONS MANUAL - VOLUME 1**

**G. Omega Qualification**

1. Captains and First Officers on the L-1011, A-300, and B-727 must complete the Omega Ground School training program for initial Omega qualification.
2. Captains will be accompanied by a Manager of Flying on first overwater Omega route. The routes are found in this Chapter in the Authorized Route section.
3. First Officers will be observed by a Manager of Flying or a Captain who is Omega qualified.
4. A Captain who has not flown an overwater route requiring Omega in the preceding 18 months must be accompanied by a Manager of Flying on his first overwater Omega flight after the 18 month period.
5. First Officer requalification will be accomplished by annual recurrent training or by review of an Omega video presentation.

**H. Qualification for Non-Scheduled Operations**

The requirements for Captain's airport and route qualification are also applicable to non-scheduled operations.



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GROUND SCHOOL

INITIAL OMEGA GROUND SCHOOL TRAINING

Each pilot requiring Omega qualification who has not been previously Eastern Air Lines qualified will be scheduled for approximately three (3) hours of training on the Omega Navigation System during Aircraft Initial/Transition or Recurrent Training.

The Initial Omega Ground School Training Program shall include instruction in the following:

- A description of the equipment and manner of installation, theory of operation, and system capabilities and limitations.
- Normal operating procedures, including procedures for testing, data insertion and cross-checking, and enroute procedures.
- Updating procedures.
- Abnormal procedures.

Omega training device will be used for demonstration and "hands-on" training as follows:

- A functional Omega CDU will be utilized to teach initialization of the Omega system.
- A CBI (Regency or equivalent) will be utilized and programmed to the flight mode to accomplish the balance of training outlined.

RECURRENT OMEGA GROUND SCHOOL TRAINING

Each Omega qualified pilot will receive Recurrent Omega Training.

The Omega Recurrent Program shall include instruction in the following:

- A review of Normal and Abnormal operating procedures with emphasis on recent changes.
- A review of recent Omega operating experience.
- Omega training devices may be used for demonstration and "hands-on" training.

OMEGA FLIGHT QUALIFICATIONS

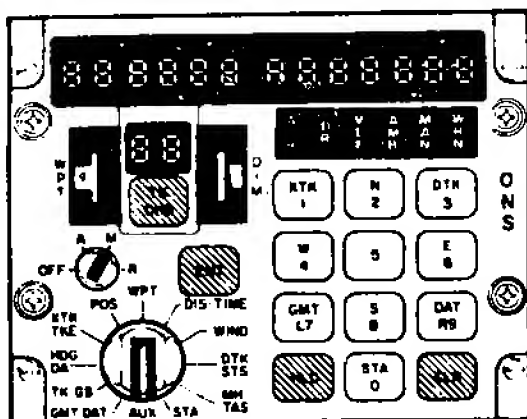
Refer to Flight Operations Manual, Volume 1, Chapter 2 (OPERATIONS SPECIFICATIONS), V., Omega Qualification.

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## OMEGA OPERATION

**LAMP DISPLAY TEST** - Moving the Mode sw from OFF provides a 5 sec test display (can be retained by setting Display Sel to AUX and WPT thumbwheel to 9). Verify the following:

- LH, RH and FROM-TO numerical displays are all 8's except the most significant digit of RH display which is R.
- LH & RH displays show degree, decimal points and arc-minute signs, NS in the least significant digit of the LH display, and EW in the least significant digit of the RH display.
- TK CHG, ENT, HLD and CLR push-buttons illuminate.
- ALR, DR, VLF, AMB, MAN, and WRN annunciators illuminate.





**OMEGA OPERATION**

**PROGRAM VERIFICATION**

- (1) Display Sel . . . . . POS
  - Verify ONS model (211) in LH display; basic program (32) and dash number (02) in RH display.

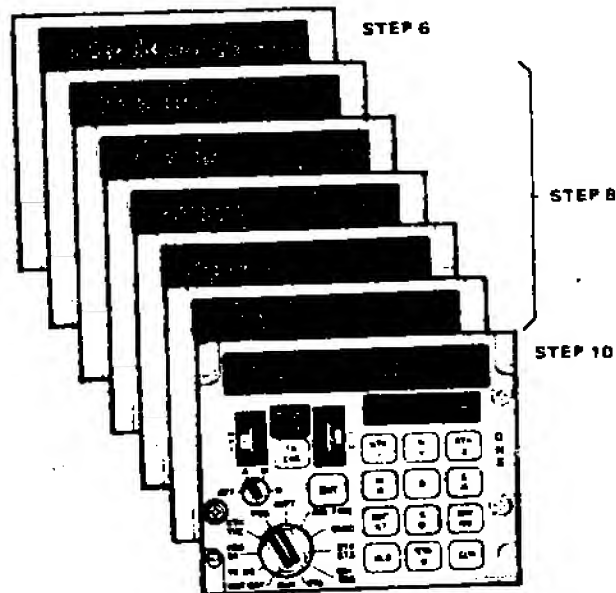
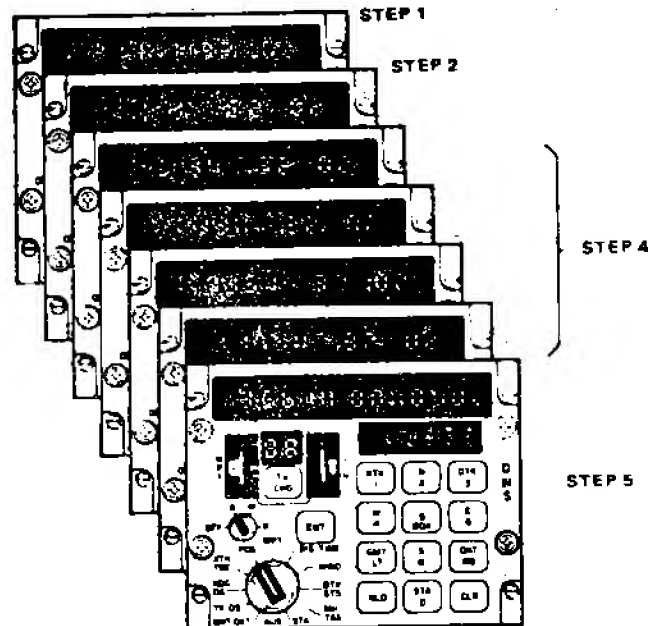
**PRESENT POSITION ENTRY**

(In the following example, aircraft position is: Latitude 33°56.1'N; Longitude 118°24.7'W.)

- (1) Display Sel . . . . . POS
- (2) N or S (on keyboard) . . . . . PRESS
  - Starts Lat. entry (N in example).
- (3) Verify LH display all blanks except for N (or S), degrees, decimals and minutes dots appear and ENT pushbutton illuminates.
- (4) Starting with the most significant digit, enter latitude to nearest tenth of a minute by pressing appropriate keys (in example, 3, 3, 5, 6 and 1).
  - Verify corresponding digit appears in least significant position and each preceding number moves one place to the left.
- (5) Verify latitude entry correct, then press ENT pushbutton.
- (6) W or E (on keyboard) . . . . . PRESS
  - Starts Long. entry (W in example).
- (7) Verify RH display all blanks except for W (or E) and degrees, decimals and minutes dots appear.
- (8) Enter longitude in the manner described for latitude in step 4.
- (9) Verify longitude entry correct, then press ENT pushbutton.
  - DR annunciator illuminates.
- (10) Verify latitude and longitude are correct.

**NOTES:** ENT pushbutton remains illuminated until GMT and DATE are entered.

If 1 OE or 2 OE or flashing characters appear in data display an operational error has been made. Refer to Abnormal Procedures section.

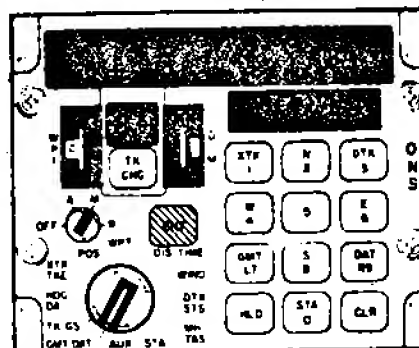




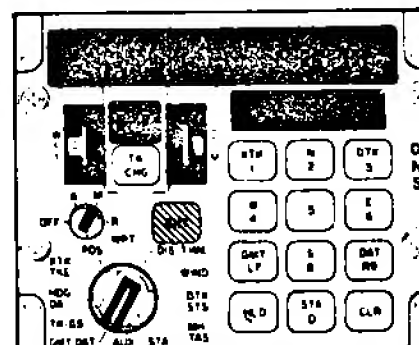
OMEGA OPERATION

**TIME & DATE ENTRY** - The time (GMT) and month/day/year (DAT) must be entered to allow ONS to automatically select stations for position fixing and navigation.

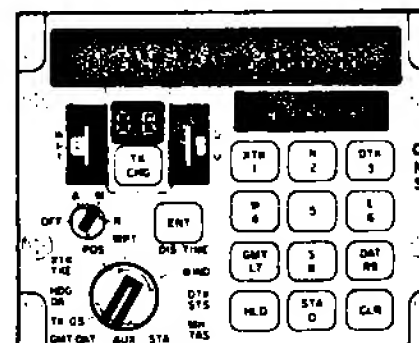
- (1) Display Sel . . . . . GMT-DAT
- (2) GMT (on keyboard). . . . . PRESS
- (3) Verify LH display all blanks.
- (4) Starting with the most significant digit, enter GMT time of day by pressing appropriate keys (example 2, 3, 4, 1).
  - Verify corresponding digit appears in least significant position and each preceding number moves one place to the left.
- (5) Verify time entry correct, then press ENT pushbutton.
- (6) DAT (on keyboard). . . . . PRESS
- (7) Verify RH display all blanks.
- (8) Enter GMT month/day/year in the manner described for time in step 4 (in this example it would be 2, 0, 8, 7, 8). Note that the day entry must be two digits.
- (9) Verify date is correct, then press ENT pushbutton (ENT goes out, DR remains on).
- (10) Verify GMT time and date entries are correct, ENT pushbutton is extinguished and DR is illuminated.



STEP 1-3



STEP 4 AND 5



STEP 6-10

OMEGA OPERATION

WAYPOINT COORDINATES ENTRY

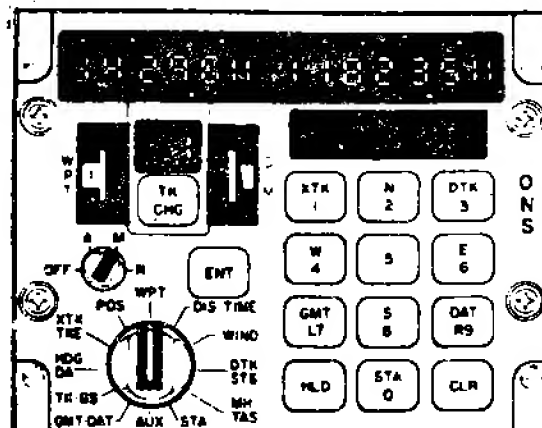
Coordinates for up to 9 WPT's may be entered during initialization on ground or after take-off. The initial enroute waypoint is normally entered in WPT-1. If a RETURN TO POINT OF DEPARTURE track is desired, the initial enroute waypoint is entered in WPT-2. Additional WPT's are then entered sequentially into subsequent WPT storage locations. Other WPT's such as takeoff, enroute, or landing alternates may be entered into unused WPT storage locations. Enter WPT's as follows:

- (1) Display Sel . . . . . WPT
- (2) WPT Sel . . . . . 1 (or 2)
- (3) Verify FROM is blank and a 1 or 2 is displayed in TO of the FROM-TO display.
  - WPT 0 is an automatic function that is reserved for establishing a track from aircraft present position and cannot be used for WPT entry.
- (4) Enter initial enroute WPT coordinates in the manner described for PRESENT POSITION ENTRY steps 2 thru 10.
  - DR does not illuminate.
- (5) Verify that initial enroute WPT lat/long are correct in LH & RH displays.
- (6) Enter the next and remaining WPT's sequentially in the manner described in steps 2 thru 5.

ADDITIONAL WAYPOINT INSERTION

Additional WPT's can be inserted into the sequence; e.g., if an additional WPT is desired between existing WPT 2 and 3, the new one is entered as WPT 3 and existing WPT's 3 thru 8 are shifted automatically and become WPT's 4 thru 9. Existing WPT 9 is automatically deleted. To edit the WPT's as described, proceed as follows (example WPT 3):

- (1) Display Sel . . . . . WPT
- (2) HLD (on keyboard) . . . . . PRESS
  - HLD illuminates.
- (3) Set WPT Sel to desired number.
- (4) Enter and verify new latitude.
- (5) ENT . . . . . PRESS
  - Note old latitude appears in LH display.
  - ENT light extinguishes.
- (6) Enter and verify new longitude.



- (7) ENT . . . . . PRESS
  - Note old longitude appears in RH display.
  - ENT light extinguishes.
- (8) HLD . . . . . PRESS
  - Note new latitude and longitude waypoints are displayed.
- (9) Rotate WPT Sel sequentially to WPT's 4 thru 9 to verify waypoints have been sequenced.

**NOTE:** WPT storage locations which do not have waypoint coordinates entered will contain 00°00.0' coordinates for latitude and longitude. When in the automatic mode, the system will not recognize this waypoint as a valid entry. Therefore, if a 00°00.0' latitude and longitude waypoint is encountered during automatic track change, the aircraft will continue on the track established between the last two valid waypoints. Additionally, the digits "99" will illuminate in the Waypoint Display.



OMEGA OPERATION

CHECKING ACCURACY OF WAYPOINTS

After all waypoints are entered, check the accuracy of entries as follows:

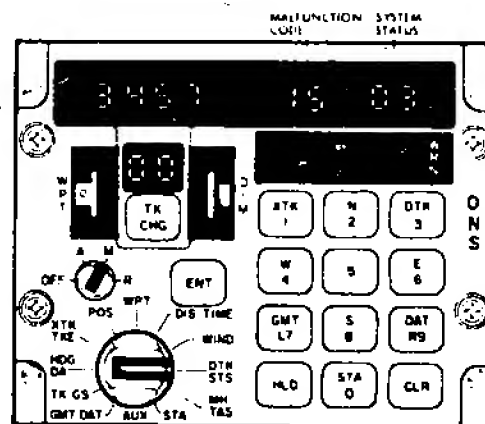
- (1) Mode Sw . . . . . A or M
- (2) Display Sel . . . . . DIS-TIME
- (3) TK CHG Pushbutton . . . . .PRESS  
- TK CHG and ENT illuminate.
- (4) 0, then 1 Pushbuttons. . . . .PRESS
- (5) ENT Pushbutton. . . . .PRESS  
- LH display indicates distance from Present Position to WPT-1. Verify the displayed distance agrees with the distance shown on the flight plan and/or appropriate navigation chart. Distance indicated may be less than flight plan distance (flight plan includes departure maneuvering).
- (6) Mode Sw . . . . . REMOTE
- (7) TK CHG Pushbutton . . . . .PRESS  
- TK CHG and ENT illuminates.
- (8) 1, then 2 Pushbuttons. . . . .PRESS
- (9) ENT Pushbutton. . . . .PRESS  
- LH display indicates distance between waypoints. Verify the displayed distance agrees with the distance shown on the flight plan and/or appropriate navigation chart.
- (10) For all subsequent waypoints, repeat steps (7) thru (10).

NOTE: FROM-TO waypoints will flash.

SYSTEM STATUS - OMEGA system status is indicated by code numbers in the least significant digits of the RH display.

- (1) Display Sel . . . . . DTK/STS  
- The status codes start at 90 at system turn-on and decrement to nav status (01) as shown on Table 1. This takes approximately 5 to 8 minutes.  
- DR will be illuminated until status 01 or 02 is achieved. Status 01 or 02 may not be achieved due to local interference at the gate. In such case, it is usually achieved when the aircraft leaves the gate area.

NOTE: On A/C 851 thru 892 when initializing at gate using APU or EPU power, a MALF code of "18" will be displayed. This is normal for these aircraft. The "18" should disappear as soon as the first generator is put on line.



STATUS	SYSTEM MODE
90	SELF TEST
80	NOT UP TO TEMPERATURE
60	SYNCHRONIZATION
30	STATION SELECTION
03	DEAD RECKONING
02	OMEGA/VLF NAVIGATION
01	OMEGA NAVIGATION

Table 1 - System Status

## OMEGA OPERATION

### STATION STATUS

The station status display provides the following information:

- Stations available for use.
- Which stations are in use.
- Which stations have been de-selected.

**NOTE:** The station status display will be all zeros until after station selection (status 30) has been completed.

If a station is known to be inoperative or unusable it should be manually de-selected, even though it may have been automatically deselected. This will preclude the possibility of automatic reselection in flight.

- To display OMEGA station status:
  - (1) Display Sel . . . . . STA
    - Station code numbers (or zeros) appear in LH & RH displays (Fig. 1) and will be steady or flashing.
  - (2) Refer to Table 2 for station status.
- To display VLF station status:
  - (1) Display Sel . . . . . AUX
  - (2) WPT Sel. . . . . 5
    - The VLF station numbers are displayed in the LH & RH displays (Fig. 2) and will be steady or flashing.
  - (3) Refer to Table 2 for station status.

STATIONS	
1.	NORWAY
2.	LIBERIA
3.	HAWAII
4.	N. DAKOTA
5.	LA REUNION
6.	ARGENTINA
7.	AUSTRALIA
8.	JAPAN

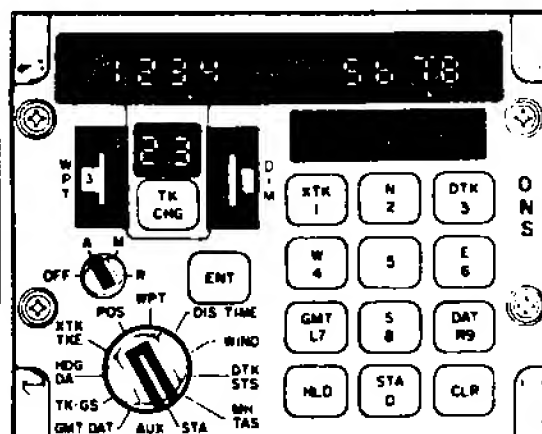


Fig. 1 - OMEGA Station Status

STATIONS	
1.	NORWAY
2.	GREAT BRITAIN (Rugby)
3.	HAWAII
4.	WASHINGTON (Sams)
5.	MARYLAND
6.	MARIE
7.	AUSTRALIA
8.	JAPAN
9.	GREAT BRITAIN (Antenna)

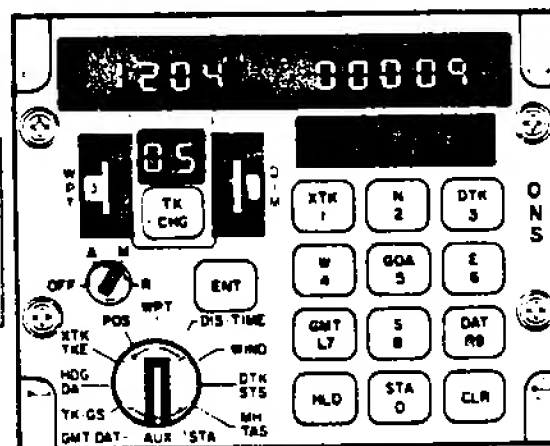


Fig. 2 - VLF Station Status

DIGIT	STEADY	PRESENTLY BEING USED
DIGIT	FLASHING	OMEGA: AVAILABLE BUT NOT BEING USED VLF: COMPUTER EVALUATING SIGNAL QUALITY FOR NAV USE
ZERO	STEADY	DESELECTED BY SYSTEM
ZERO	FLASHING	DESELECTED BY OPERATOR

Table 2 - Station Status

## OMEGA OPERATION

### STATION QUALITY

- A minimum of three stations, having quality reception, are required for position fixing.
  - Station signal qualities read from 0 to 40 for both OMEGA stations and VLF stations. However, for navigation, only OMEGA stations with signal quality of 12 to 40 and VLF stations with signal quality of 18 to 40 are utilized.
  - A reading of 06 that alternates to 00 approximately every 9 seconds on all frequencies, indicates this station is being utilized to calibrate the aircraft antenna. The weakest station is used for antenna calibration and, therefore, would not be used for navigation.
- To check OMEGA station quality:
    - (1) Display OMEGA station status as described in STATION STATUS procedure.
    - (2) Station Number (on keyboard) . . . . . PRESS  
(Station #4 in Fig. 3)
      - The station number and the quality of its transmissions on the three frequencies will be displayed as shown in Fig. 3.
  - To check VLF station quality:
    - (1) Display VLF station status as described in STATION STATUS procedure.
    - (2) XTK Pushbutton . . . . . PRESS
      - Signal quality of each of the four active (non zero) stations is displayed in sequence in LH & RH displays as shown in Fig. 4 (e.g., qualities of stations 1, 2, 4, 9 from Fig. 2 station status shown in sequence left to right).
    - (3) To restore station number display: CLR Pushbutton . . . . . PRESS
- OR,
- Display Sel . . . . . MOVE OUT OF  
AND BACK TO AUX

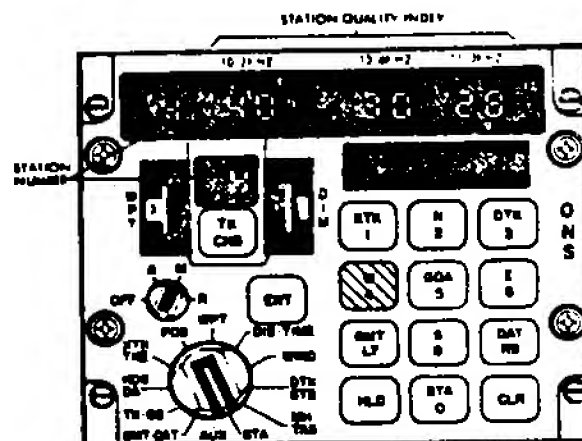


Fig. 3 - OMEGA Station Quality

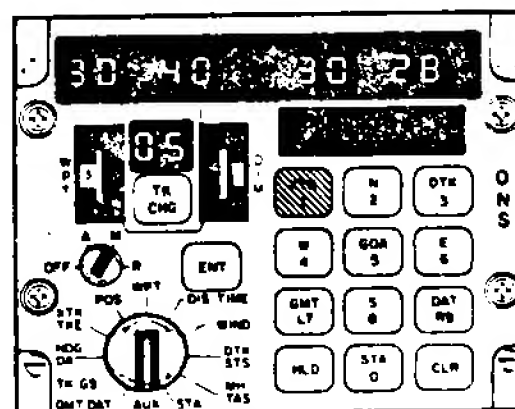


Fig. 4 - VLF Station Quality

## STATION DESELECTION

### MANUAL DESELECTION

An OMEGA station(s) may be declared unusable for navigation and deselected manually.

NOTE: Manual deselection of VLF stations is not authorized at this time.

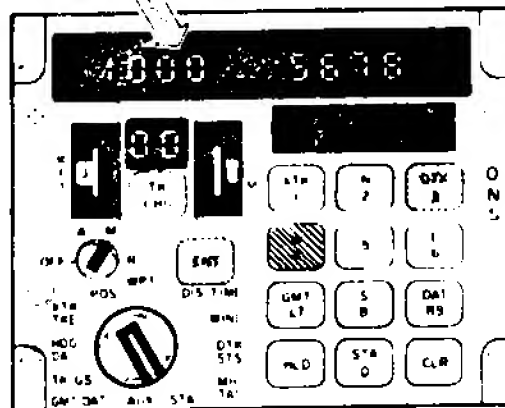
OMEGA stations may be manually deselected as follows:

- (1) Display Sel . . . . . STA  
- Verify station status is displayed.
- (2) STA . . . . . PRESS  
- Verify ENT illuminates.
- (3) Station Number of station(s) to be deselected . . . . . PRESS  
- Verify that corresponding station digit(s) is replaced by flashing zero in display.
- (4) ENT Pushbutton . . . . . PRESS  
- Verify that corresponding station digit(s) is flashing zero indicating that station(s) has been deselected.

### AUTOMATIC DESELECTION

Some OMEGA and VLF stations are deselected automatically. A station may deselect for modal interference, special applications or when the transmitting station is in twilight (dusk or dawn):

- MODAL
  - All stations 0 to 300 nautical miles from aircraft will deselect.
  - Liberia, Norway and Argentina stations will deselect when aircraft is in the geographical area shown below.
- SPECIAL
  - Hawaii station in the geographical area bounded by:  
N30° to N65°; W30° to E30°

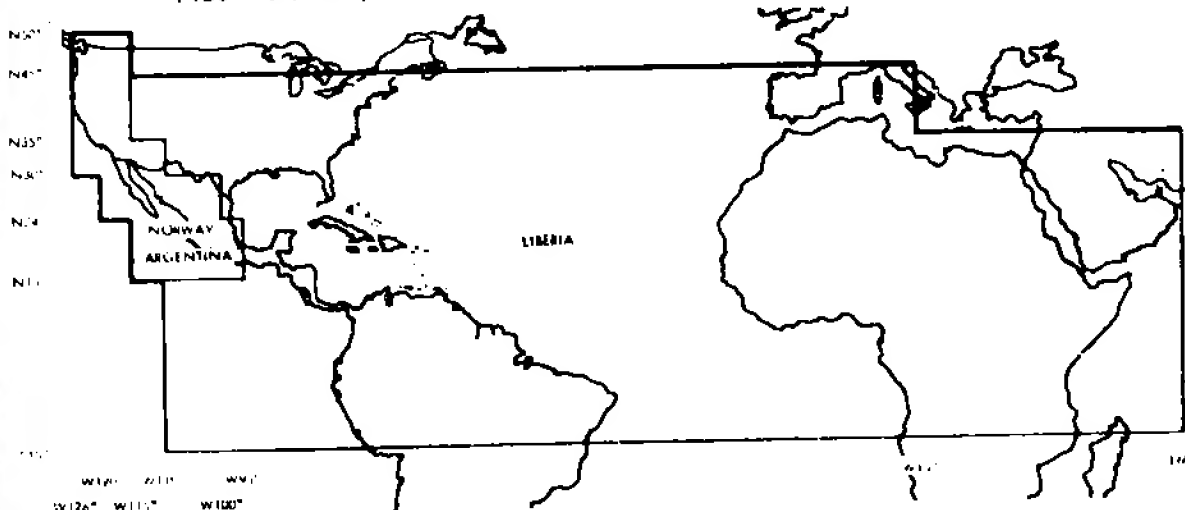


### STATION RESELECTION

A station that has been manually deselected (by flight crew) may be re-selected as follows:

- (1) Display Sel . . . . . STA  
- Verify station status is displayed.
- (2) STA (on keyboard) . . . . PRESS  
- Verify ENT illuminates.
- (3) Station Number (on keyboard) of stations(s) to be reselected . . . . . PRESS  
- Verify that corresponding flashing zero(s) changes to steady station number.
- (4) ENT Pushbutton . . . . . PRESS

CAUTION: PRESSING DATA KEYS FOR STATIONS THAT ARE NOT ZERO DURING THIS PROCEDURE WILL DESELECT THESE STATIONS.





### INITIAL TRACK SELECTION

The initial track must be selected by the pilot. It represents the great-circle route from present position at time of insertion, to the selected initial enroute WPT (1 or 2). To select the initial track:

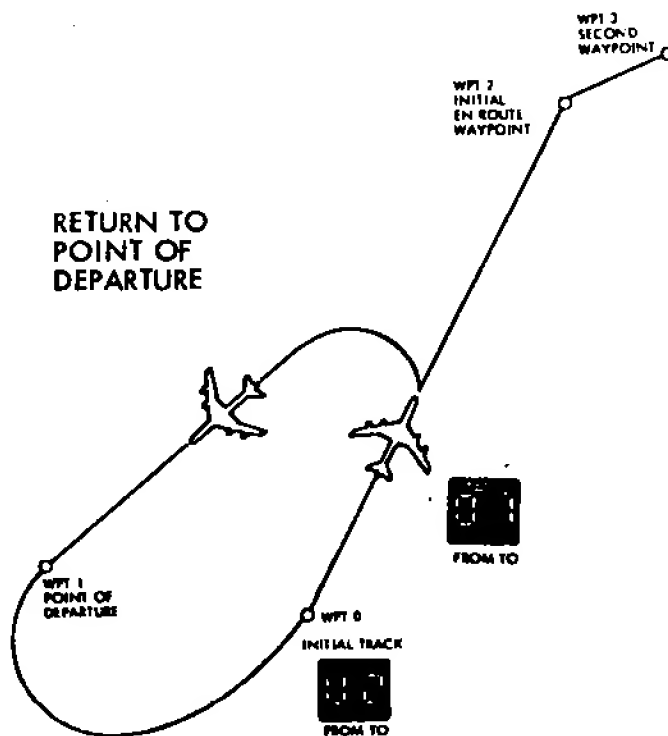
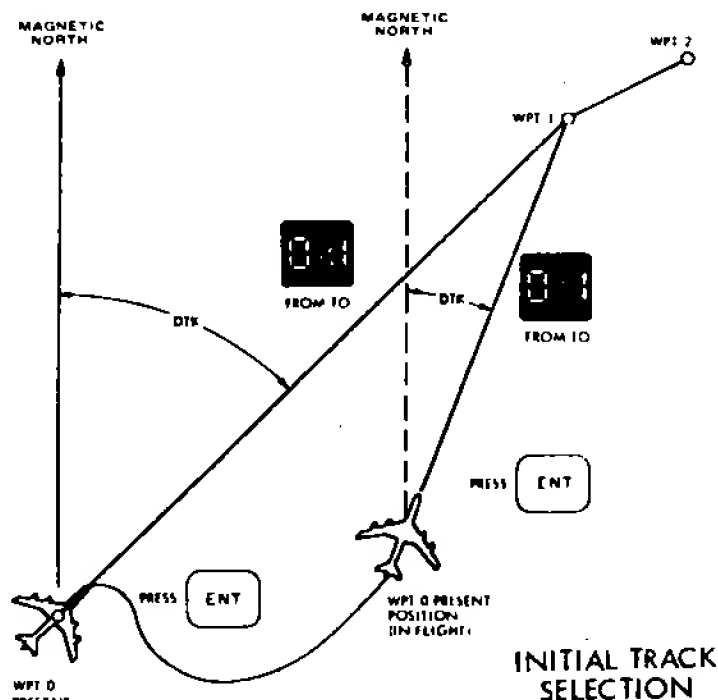
NOTE: The positions of the Display Sel and WPT Sel do not affect this procedure.

- (1) Verify Mode Sw set to M or A.
- (2) TK CHG Pushbutton . . . . .  
 . . . . . PRESS  
 - Verify TK CHG and ENT illuminate.
- (3) Press 0 (on keyboard) and then press number representing initial enroute WPT (example 1).
- (4) Verify numbers inserted in step 3 appear in FROM-TO display (example 0-1).
- (5) ENT Pushbutton . . . PRESS  
 - Starts initial track.  
 - Verify ENT and TK CHG extinguish.

NOTE: Cross track distance and track-angle error (XTK/TKE), distance and time to next WPT (DIS-TIME) and desired track (DTK) data are not available until a track leg is initiated.

### RETURN TO POINT OF DEPARTURE ENTRY

If WPT 1 is inserted as a usable approach fix to the airport of departure and the initial enroute waypoint is inserted in WPT 2, the initial enroute track will be 0-2. A return to point of departure (via WPT 1) from present position (WPT 0) may be manually initiated using the procedure above.



## OMEGA OPERATION

### TRACK LEG CHANGE AT WPT

#### Automatic and Manual Modes:

With ONS in status 01 or 02, it provides the same data whether the Mode Sw is set to A (automatic) or to M (manual). The terms automatic or manual mode apply only to track selection. CDU display function and waypoint position entry may be accomplished with Mode Sw in A or M position.

- **Automatic Mode** - With Sw set to A, the change to the next sequential track leg at each WPT is initiated automatically as shown in Fig. 5. The ALR light will illuminate approximately 2 to 3 minutes from the waypoint (depending on groundspeed and track leg change angle). The ALR light will extinguish 1.5 minutes after illuminating.
  - With Mode Sw set to A, manual override feature is provided by operation of the TK CHG pushbutton.
- **Manual Mode** - With the Mode Sw set to M, the change to the next sequential track leg at each WPT must be initiated manually by the pilot as shown in Fig. 6. The ALR light will illuminate approximately 2 to 3 minutes from the waypoint (depending on groundspeed and track leg change angle). The ALR light will start flashing 1.5 minutes after illuminating and will continue flashing until the track leg change is made. Additionally, the FROM-TO display does not change and navigation data will continue to be for the 0 - 1 track until the change is made.

Initiate a track leg change as follows:

- (1) Mode Sw . . . . . A or M
- (2) Display Sel . . . . . ANY POSITION  
BUT WPT or AUX
- (3) TK CHG Pushbutton . . . . . PRESS  
- TK CHG & ENT illuminate.
- (4) WPT Numbers (on keyboard) . . . . PRESS  
- Press FROM # first, then press  
TO # (1 - 2 in example Fig. 6).
- (5) Verify FROM-TO displays selected WPT  
numbers.
- (6) ENT Pushbutton . . . . . PRESS  
- TK CHG, ENT and ALR extinguish  
and FROM-TO displays new track  
leg (1 - 2 in Fig. 6).
- (7) Check that new track angle is reasonable.

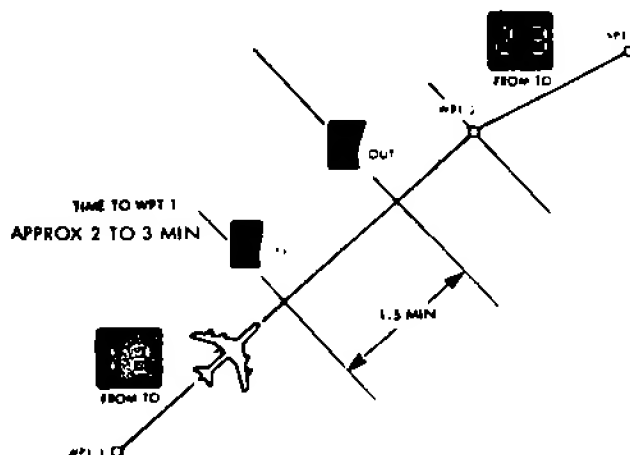


Fig. 5 - Automatic Mode

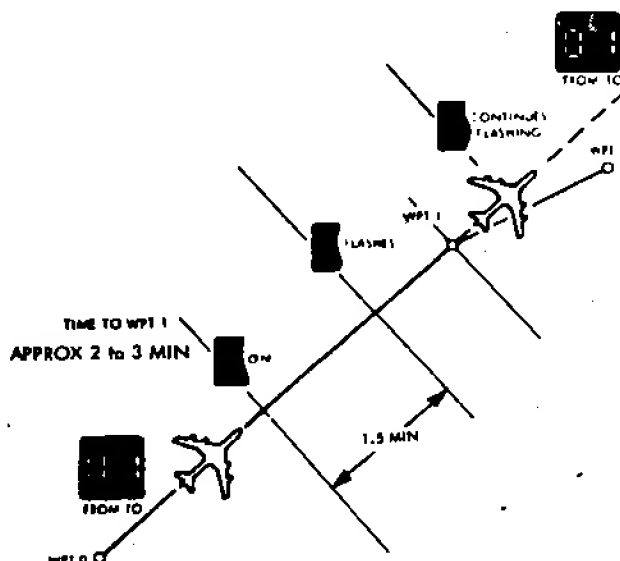


Fig. 6 - Manual Mode

## OMEGA OPERATION

### TRACK LEG CHANGE FROM PRESENT POSITION

- (1) Mode Sw . . . . . A or M
- (2) Display Sel . . . ANY POSITION  
BUT WPT or AUX
- (3) TK CHG Pushbutton . . . . . PRESS  
- TK CHG & ENT illuminate.
- (4) 0, then WPT# (on keyboard)  
. . . . . PRESS  
- First press 0 to insert present  
position, then press desired  
WPT# (0-4 in Fig. 7). Check  
FROM-TO displays 0-4.
- (5) ENT Pushbutton . . . . . PRESS  
- TK CHG & ENT extinguish  
and FROM-TO displays new  
track leg (0-4 in Fig. 7).

### WAYPOINT BYPASSING

Waypoints may be bypassed by using the TRACK LEG CHANGE AT WPT or the TRACK LEG CHANGE FROM PRESENT POSITION procedures.

### WAYPOINT POSITION CHANGE

- WPT coordinates may be changed, or future WPT coordinates may be entered into past WPT storage locations. This is accomplished by use of the WAYPOINT COORDINATES ENTRY Procedure. If past WPT storage locations are to be used for future WPT's:

- Enter future WPT's sequentially starting with WPT 1.
- Automatic (Mode Sw in A) track leg switching sequences from WPT 9 to WPT 1.

**CAUTION: DO NOT CHANGE COORDINATES OF "FROM" or "TO" WPT'S OF TRACK LEG BEING FLOWN.**

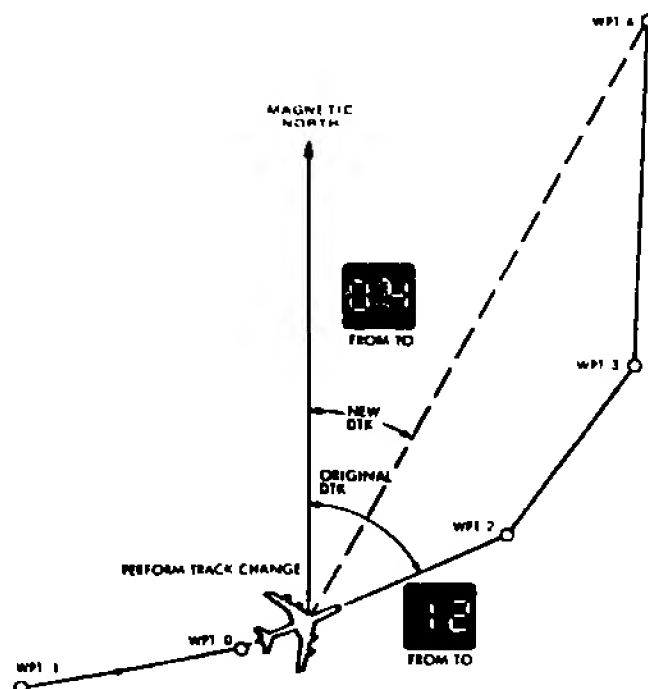


Fig. 7 - Track Leg Change from Present Position

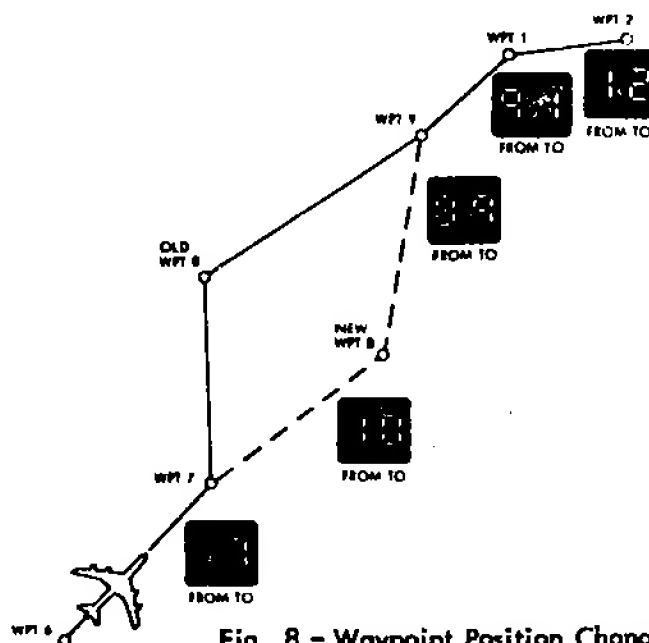


Fig. 8 - Waypoint Position Change



OMEGA OPERATION

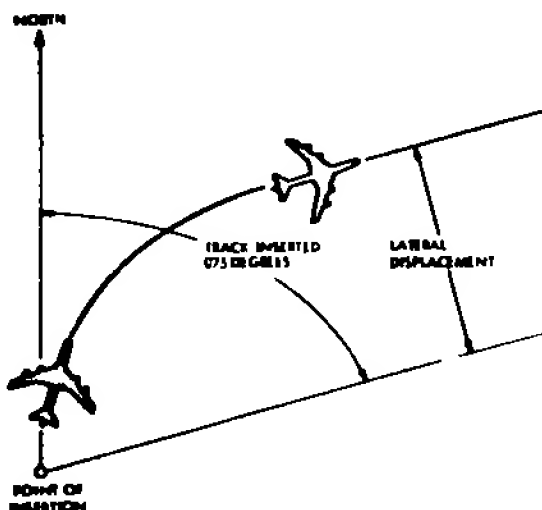
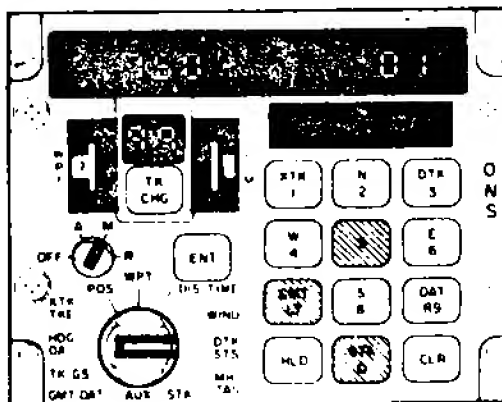
TRACK HOLD MODE

This mode provides navigation on a track referenced to magnetic north rather than a WPT to WPT track leg.

- (1) Mode Sw . . . . . A or M
- (2) Display Sel . . . . . DTK/STS
- (3) DTK (on keyboard) . . . . . PRESS  
-LH display blanks; ENT illuminates.
- (4) Desired Track Angle . . . . . SELECT  
- Using data keyboard, select desired track angle to nearest tenth of a degree (example 075.0°)
- (5) Verify selected track angle appears in LH display.
- (6) ENT Pushbutton . . . . . PRESS  
-ENT extinguishes; FROM - TO displays 9-9.  
- Check DIS-TIME and XTK displays are all zeros.

The desired track is now inserted. If the AP/FD is coupled to OMEGA, the aircraft will start a turn (at point of insertion) and will control the aircraft on a line parallel to the inserted track. The lateral displacement from the inserted track is dependent upon the max roll rate of the AP and aircraft speed.

- (7) When desired, return to WPT to WPT navigation by initiating a track change entry.







OMEGA OPERATION

DESIRED CROSS-TRACK OFFSET

This mode provides navigation on an offset track that is parallel to the WPT to WPT track leg.

(1) Display Sel . . . . . XTK/TKE

Note: ONS must have an active track leg in FROM-TO display.

(2) XTK (on keyboard) . . . . . PRESS  
- LH display blanks; ENT illuminates.

(3) Desired Offset Track . . . . . SELECT  
- Using data keyboard, select desired offset track to nearest tenth of a nautical mile (example press L, 5 and 3 in succession for L5.3 NM).

(4) Verify selected offset track appears in LH display.  
- If incorrect, press CLR and repeat steps 2, 3 and 4.

(5) ENT Pushbutton . . . . . PRESS  
- MAN light will illuminate.  
- Verify LH display returns to values displayed prior to insertion.  
- If AP/FD is coupled to OMEGA, aircraft turns toward offset track.

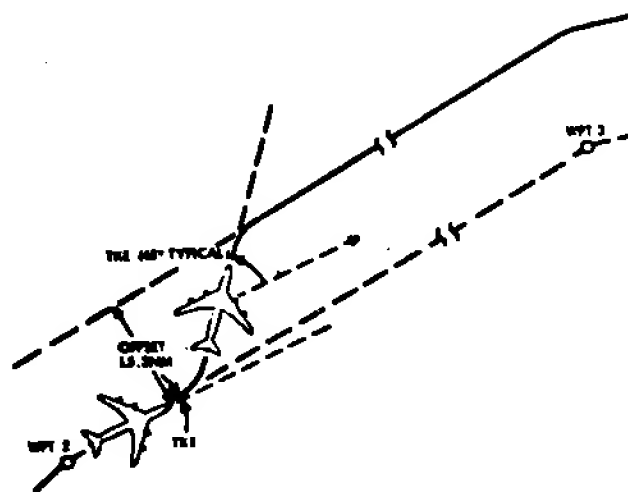
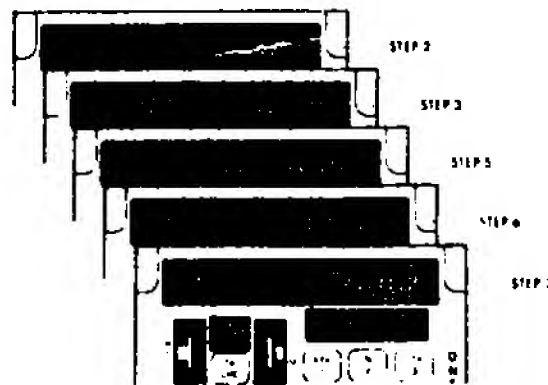
(6) TKE steadily increases and XTK increments towards inserted offset distance.

(7) As offset track is approached, aircraft turns and follows offset track. As turn progresses, TKE decreases to zero (RH display) and XTK distance (example L5.3) is displayed in LH display.

Note: The inserted XTK may be displayed (LH display) by setting Mode Sw to R and the Display Sel to XTK/TKE. The cross-track offset remains in effect until removed by the pilot.

(8) To return to original track:  
• Display Sel . . . . . XTK/TKE  
• Press XTK pushbutton, then L or R and ENT.  
- MAN light will extinguish.

Note: A cross-track offset is automatically removed when a TRACK LEG CHANGE FROM PRESENT POSITION is entered.





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**OMEGA OPERATION**

**POSITION CHECK**

The present position can be compared with an accurate known fix as follows:

(1) Display Sel . . . . . POS

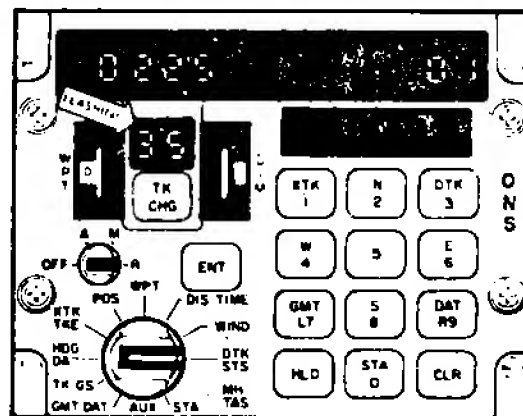
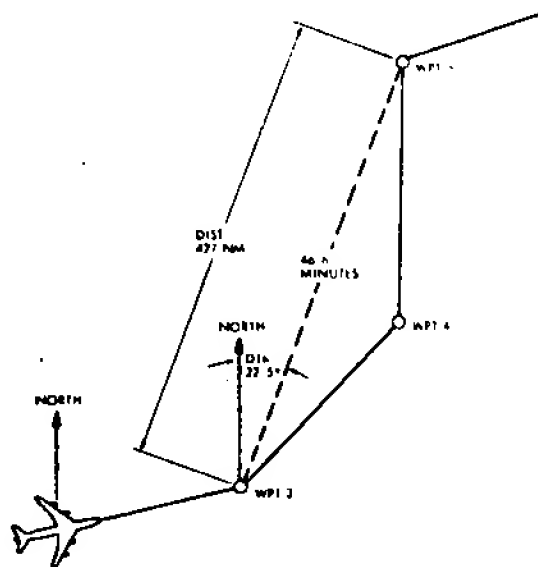
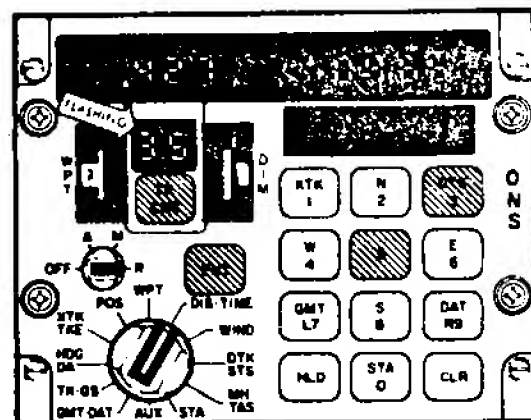
When at known position fix:

(2) HLD (on keyboard) . . . . . PRESS

- Present position and GMT displays are frozen - ONS continues computing position changes.

(3) Compare frozen present position coordinates (CDU) with coordinates of position fix obtained by other means. Frozen GMT provides the time of position check for recording purposes.

NOTE: If a position update is required, refer to OMEGA procedures in the Abnormals Procedures section (A-19).





# REMOTE DIRECT RANGING FROM PRESENT POSITION

- (1) Display Sel . . . . . DIS-TIME
- (2) Mode Sw . . . . . R
  - FROM-TO flashes.
  - ALR annunciator and track leg change functions are as described for manual mode (page N-19-16).
- (3) TK CHG Pushbutton . . . . . PRESS
  - TK CHG & ENT illuminate.
- (4) Desired WPT, then 0 . . . . . PRESS
  - Verify FROM-TO displays the two points (e.g., 3-0 in Fig. 9).
- (5) ENT Pushbutton. . . . . PRESS
  - ENT and TK CHG extinguish.
- (6) The direct great circle DIS-TIME between present position and selected WPT appears in LH Display.
  - TIME display is based on actual grd speed when TAS is more than 110 kts, or on a fixed 480 kts when TAS is less than 110 kts.
- (7) GMT (on keyboard) . . . . . PRESS
  - The ETA from present position to selected WPT (if flown direct) appears in RH Display.
- (8) Display Sel . . . . . DTK/STS
  - DTK from present position to selected WPT appears in LH Display.
- (9) Mode Sw . . . . . A or M
  - Normal FROM-TO, DIS-TIME and DTK displays are restored for track leg being flown.
  - The remote ranging DIS-TIME and DTK can be recalled at any time simply by resetting the Mode Sw to R. The DIS-TIME will automatically be updated as the flight progresses.

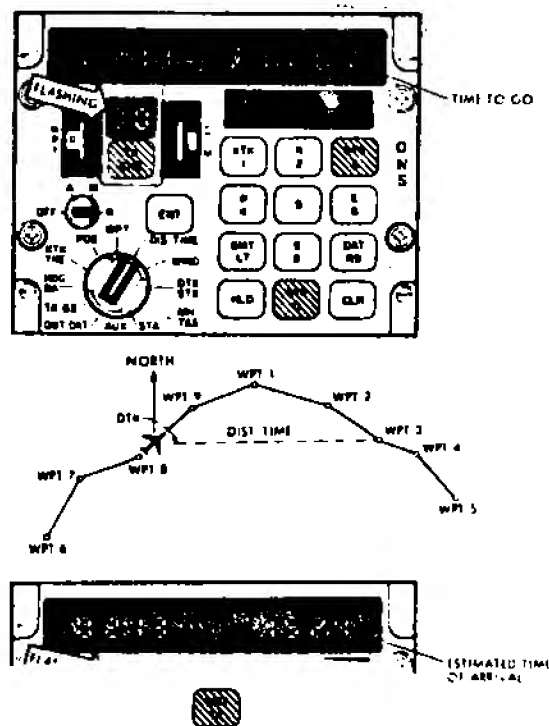


Fig. 9

OMEGA OPERATION

REMOTE RANGING ALONG FLIGHT  
PLAN

- (1) Display Sel . . . . . DIS-TIME
- (2) Mode Sw . . . . . R
  - FROM-TO flashes.
  - ALR annunciator and track leg change functions are as described for manual mode (page N-19-16).
- (3) TK CHG Pushbutton . . . . . PRESS
  - TK CHG & ENT illuminate.
- (4) Data Key 0 and Desired WPT Key . . . . . PRESS
  - Verify numbers appear in FROM-TO display (e.g., 0-5 in Fig. 10).
- (5) ENT Pushbutton . . . . . PRESS
  - ENT and TK CHG extinguish.
- (6) Total DIS along flight plan between present position and selected WPT appears in LH display. The TIME from present position (following flight plan) appears in RH display.
  - TIME display is based on actual grd speed when TAS is more than 110 kts, or on a fixed 480 kts when TAS is less than 110 kts.
- (7) GMT (on keyboard) . . . . . PRESS
  - The ETA from present position to selected WPT (if flown direct) appears in RH Display.
- (8) Display Sel . . . . . DTK/STS
  - DTK from present position to selected WPT appears in LH Display.
- (9) Mode Sw . . . . . A or M
  - Normal FROM-TO, DIS-TIME and DTK displays are restored for track leg being flown.
  - The remote ranging DIS-TIME and DTK can be recalled at any time simply by resetting the Mode Sw to R. The DIS-TIME will automatically be updated as the flight progresses.

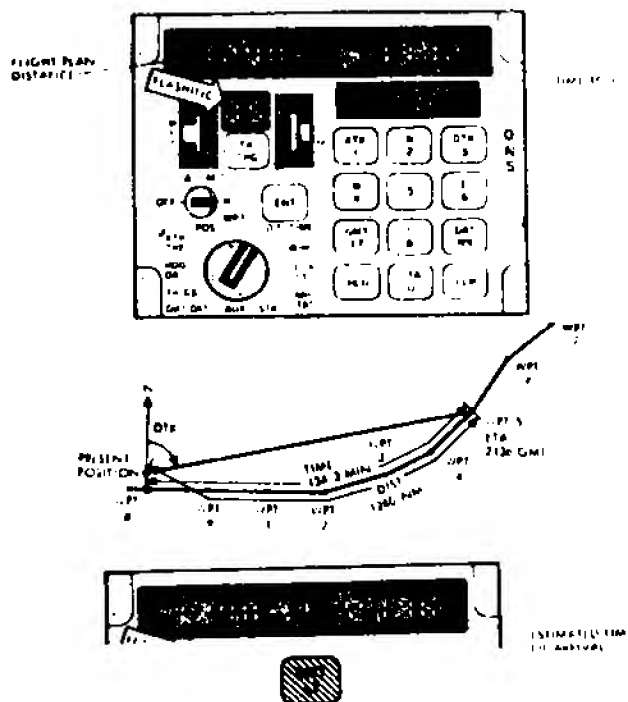


Fig. 10



OMEGA OPERATION

INTERIM WAYPOINT DETERMINATION

The OMEGA/VLF 211-32-02 program offers the capability of calculating interim waypoints along the great-circle route between:

- Aircraft present position to any waypoint.
- Any two selected waypoints.

Either the latitude or longitude of a desired reporting waypoint is entered by the operator and the ONS computer will calculate the corresponding longitude or latitude.

In the following example, the aircraft will navigate from LAX at  $33^{\circ}56.1'N$  and  $118^{\circ}24.7'W$  to JFK at  $40^{\circ}38.2'N$  and  $73^{\circ}46.2'W$ , and it is desired to establish a reporting waypoint at which the aircraft will cross a latitude of  $39^{\circ}00.0'N$ . The coordinates of this interim waypoint may then be entered into an unused waypoint location and, using the REMOTE RANGING feature, distance, time-to-go, and ETA may be determined.

For the purposes of illustration (Fig. 11), the following procedure shows JFK entered into WPT 5 thus allowing four reporting waypoints to be stored in location 1 through 4 along the route.

Enter and display an interim waypoint as follows:

- (1) Display Sel . . . . . POS  
- Verify coordinates of LAX.
- (2) Display Sel . . . . . WPT
- (3) WPT Sel (thumbwheel) . . . . . 5
- (4) Enter coordinates of JFK.

NOTE: If track change is to be made between numbered waypoints such as 1-5, steps 5, 6, and 7 may be omitted.

- (5) TK CHG Pushbutton . . . . . PRESS  
- TK CHG and ENT illuminate.
- (6) 0, then 5 Pushbutton . . . . . PRESS
- (7) ENT Pushbutton . . . . . PRESS  
- To establish present position of aircraft at LAX.
- (8) Display Sel . . . . . AUX
- (9) WPT Sel . . . . . 7
- (10) TK CHG Pushbutton . . . . . PRESS  
- TK CHG and ENT illuminate.
- (11) 0, then 5 Pushbutton . . . . . PRESS
- (12) ENT Pushbutton . . . . . PRESS  
- To enter 0-5 track change.
- (13) Enter latitude of desired interim waypoint (e.g.,  $39^{\circ}00.0'N$ ) and verify entered data correct.

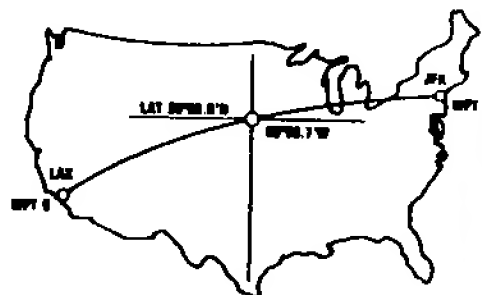


Fig. 11

- (14) ENT Pushbutton . . . . . PRESS  
- Computer will calculate and display, in RH display, the corresponding longitude of the interim waypoint along the great-circle route from LAX to JFK ( $99^{\circ}50.7'W$ ).

NOTE: In other cases it may be required to determine the latitude of an interim waypoint at a specific longitude. In such cases, the longitude would be entered in step (13) and the latitude displayed in the LH display after accomplishing step (14).

This procedure can also be used while airborne, beginning with step (5), to establish an Interim waypoint with a TK CHG entry of 0-X (0 represents present position and X the terminus of the great-circle flight path). Invalid coordinates that do not fall on the great-circle route will be displayed on the CDU as flashing entries on the LH or RH displays and the CLR pushbutton will illuminate.

NOTE: If it is desired to enter an interim waypoint, the WAYPOINT COORDINATES ENTRY or the ADDITIONAL WAYPOINT INSERTION procedure must be used.

## OMEGA OPERATION

### COUPLING & UNCOUPLING OMEGA

#### To Couple OMEGA to Captain's Instruments:

1. OMEGA completely initialized.
  - WARN and DR light out.
2. Captain's VHF NAV set to a VOR frequency.
3. Press OMEGA engage switchlight.
  - Check legend "CRS IND on OMEGA" illuminates.
  - Check that OMEGA navigation information is displayed on Captain's Course Indicator and Compass Indicator.  
(Rotate the course arrow to the DTK displayed on the CDU or the heading shown under the No. 1 needle of the Captain's Compass Indicator if it is selected to VOR.)

#### To Couple OMEGA to AP:

4. Autopilot engaged.
5. Set Mode select switch to AUX NAV position.
  - Check "AUX NAV" appears on Approach Progress Display (APD).
  - Check that AP controls the roll axis in response to OMEGA NAV guidance.

#### To Uncouple OMEGA from AP:

- Rotate AP MODE selector to MANUAL position.
  - Check the "AUX NAV" annunciation on AP MODE annunciator extinguishes.

#### To Uncouple OMEGA from Captain's Instruments:

- Press associated OMEGA engage switchlight.
  - Check that switch releases and legend "CRS IND on OMEGA" extinguishes.

### POST FLIGHT PROCEDURES

- At intermediate stops, the ONS should be left ON if OMEGA is to be used for subsequent flight leg(s). Turning system OFF will cancel all prior programming.

#### When OMEGA Shutdown is Desired:

- Pull Mode Sw and set to OFF.
  - Verify that all displays are blank.

NOTE: Because the autopilot will immediately roll the aircraft to capture the DTK upon coupling to OMEGA, it is desirable to couple when the XTK distance is small to avoid excessive bank angles.

### OMEGA MALFUNCTIONS (GENERAL)

When an OMEGA malfunction occurs, refer to the appropriate Abnormal Procedure (A-19) if applicable.

Additionally, if the unit becomes inoperative and/or a logbook entry is required, record the following information:

- Greenwich Mean Time
- Geographical Location
- Malfunction Code
- Station Frequencies being used (Aux 3)
- Station Status



OMEGA

**MANUAL ENTRIES**

WIND ENTRY

→ Wind entry should not be made if system is in navigation mode (status 01 or 02) because navigation accuracy could be affected. However, DR navigation can be improved by manually entering wind.

DR Lt . . . . . ON  
DISPLAY Sel . . . . . WIND  
L7 Pb . . . . . PRESS

→ Ensure system is in DR mode, status 03.

→ LH display extinguishes and ENT pushbutton illuminates.

Enter wind direction to nearest degree (0° to 359°) and verify entered data correct, then:  
ENT Pb . . . . . PRESS  
R9 Pb . . . . . PRESS

→ ENT pushbutton remains illuminated.

Enter wind speed to nearest knot (1 to 299K) and verify entered data correct, then:

ENT Pb . . . . . PRESS

→ ENT pushbutton extinguishes and displays indicate the entered values;  $\pm 1^\circ$  or  $\pm 1$  Kt.

Update as required while in DR mode. Wind will automatically update when ONS upgrades to 01 or 02 status.

DRIFT ANGLE AND GROUND SPEED ENTRY AND REMOVAL

→ Use only in DR mode to manually enter drift angle and ground speed.

DR Lt . . . . . ON  
DISPLAY Sel . . . . . AUX  
WPT Sel (Thumbwheel) . . . . . 1  
L7 Pb . . . . . PRESS

→ Ensure system is in DR mode, status 03.

→ LH display extinguishes and ENT pushbutton illuminates.

L7 or R9 Pbs. . . . . PRESS

→ Pressing L7 pushbutton will indicate left drift angle; pressing R9 pushbutton will indicate right drift angle.

Enter drift angle to nearest tenth of a degree, then:

→ System will only accept drift angle up to 39.9 degrees.

ENT Pb . . . . . PRESS

→ ENT pushbutton remains illuminated.

R9 Pb . . . . . PRESS

→ RH display extinguishes.

Enter ground speed to nearest knot, then:

ENT Pb . . . . . PRESS

→ ENT pushbutton extinguishes.

Verify that entered data correct and that value of calculated wind is reasonable.

Update as necessary to maintain accurate DR navigation. When manual heading entry no longer required (aircraft is providing input) repeat above procedure except enter zeros.



OMEGA

**MANUAL ENTRIES**

(Continued)

HEADING ENTRY AND REMOVAL

DISPLAY Sel . . . . . MH TAS  
L7 Pb . . . . . PRESS

→ LH display extinguishes and ENT pushbutton illuminates.

Enter aircraft heading (zero to 359.9°) to nearest tenth of a degree, then:

ENT Pb . . . . . PRESS

→ Verify entered data correct, MAN annunciator illuminates and that LH display flashes.

Update as required by changes in aircraft heading. When manual heading entry no longer required (aircraft is providing input) repeat above procedure except enter zeros. MAN annunciator will extinguish and system will resume using aircraft input.

TAS ENTRY AND REMOVAL

DISPLAY Sel . . . . . MH TAS  
R9 Pb . . . . . PRESS

→ RH display extinguishes and ENT pushbutton illuminates.

Enter aircraft true airspeed to the nearest knot, then:

ENT Pb . . . . . PRESS

→ Manual entry of TAS may be made from 101 to 650 knots.

→ Verify entered data correct, MAN annunciator illuminates and RH display flashes.

Update is required for aircraft true airspeed changes. When manual airspeed entry no longer required (aircraft is providing input) repeat above procedure except enter zeros. MAN annunciator will extinguish and system will resume using aircraft input.

**AMBIGUITY (AMB) LIGHT ON**

→ Illumination of AMB annunciator during OMEGA navigation indicates ambiguity between calculated and displayed present position.

Manually deselect any OMEGA station reported more than 1/4 lane (4 N.M.) off, and clear ambiguity as follows:

DISPLAY Sel. . . . . AUX  
WPT Sel (Thumbwheel). . . . . 0  
O Pb . . . . . PRESS  
CLR Pb . . . . . PRESS

→ Check latest NOTAM information available.

→ Observe 0 appears in From/To display and R appears in RH display.

→ AMB annunciator will extinguish after approximately 15 seconds.

If ambiguity persists or recurs, repeat above procedure or accomplish PRECISION UPDATE, NON-PRECISION UPDATE or RELANING INITIATION, as appropriate.

→ AMB annunciator may illuminate when aircraft is in twilight (dusk or dawn).



OMEGA

**PRECISION UPDATE**

DISPLAY Sel . . . . . POS  
WPT Sel (Thumbwheel) . . . . . ANY  
POSITION BUT 0

Position update can be accomplished by use of an alternate means of position determination (VOR, recognizable landmarks, etc.)

At moment of overflying fix point:

HLD Pb . . . . . PRESS → Observe HLD illuminates.

Enter latitude of known fix point and verify entered data correct:

ENT Pb . . . . . PRESS → Unupdated latitude coordinates appear.

Enter longitude of known fix point and verify entered data correct:

ENT Pb . . . . . PRESS → Unupdated longitude coordinates appear.

HLD Pb . . . . . PRESS → Observe HLD extinguishes.  
Present position coordinates appear in LH and RH displays; DR and AMB annunciators will remain illuminated until actual position is calculated.

**NON-PRECISION UPDATE**

DISPLAY Sel . . . . . POS  
WPT Sel (Thumbwheel) . . . . . 0  
HLD Pb . . . . . PRESS

Position update can also be accomplished if a position fix is known that is within 60 nautical miles of present position.

Observe HLD illuminates.

Enter latitude of fix point and verify entered data correct:

ENT Pb . . . . . PRESS → Unupdated latitude coordinates appear.

Enter longitude of fix point and verify entered data correct:

ENT Pb . . . . . PRESS → Unupdated longitude coordinates appear.

HLD Pb . . . . . PRESS → Observe HLD extinguishes.  
Updated present position coordinates appear in LH and RH displays; DR and AMB annunciators will remain illuminated until actual position is calculated.

**RELANING INITIATION**

DISPLAY Sel . . . . . AUX

Relaning should not be initiated if ambiguity occurs during sunrise or sunset and pilot is in doubt as to whether ONS position is correct.

WPT Sel (Thumbwheel) . . . . . 0

Observe 0 appears in From/To display and R appears in RH display.

0 Pb . . . . . PRESS  
ENT Pb . . . . . PRESS

Verify DR illuminates and that AMB remains illuminated. Annunciators will extinguish when normal ONS navigation resumes.

OMEGA

**DISPLAY FAULTS**

NO DIGITAL CHARACTERS IN LEFT/  
RIGHT OR FROM/TO DISPLAYS

- DIM Sel . . . . . CHECK → Ensure that selector is not at full decreased intensity.
- POWER SOURCE. . . . . CHECK → The system is powered by AC ESS RADIO BUS thru OMEGA NAV C/B located on the P18-2 panel.
- If characters remain extinguished, maintenance action is required.

1 OE OR 2 OE APPEARS IN RIGHT  
DISPLAY

- Indicates operator error has been made. CLR pushbutton will be illuminated.

- CLR Pb . . . . . PRESS → Clears RH display to permit entry of correct data; CLR pushbutton extinguishes.

Reenter correct data.

DIGITAL CHARACTERS IN LEFT/RIGHT  
DISPLAY FLASHING

- Indicates operator error has been made. CLR pushbutton will be illuminated.

- CLR Pb . . . . . PRESS → Clears flashing display to permit entry of correct data; CLR pushbutton extinguishes.

Reenter correct data.

99 APPEARS IN FROM/TO DISPLAY

If indication not normal, enter coordinates for next waypoint and establish new track.

- Indication normal if in Track Hold mode; no action necessary. Flashing ALR annunciator indicates system is not in Track Hold mode, that all zeros are loaded in next waypoint and automatic track leg change has not occurred; system is still operating with respect to prior established track.
- EXAMPLE: With all zeros loaded in WPT 6 and aircraft approaching WPT 5, system will not switch automatically to the 5 to 6 track, but will remain on the 4 to 5 track, 99 will appear in FROM/TO display and ALR annunciator will flash.

**GRID ANGLE OFFSET**

EAL flight crews are not permitted to make manual entries of grid navigation parameters at this time.

OMEGA

**WARNING (WRN) LIGHT ON**

If WRN annunciator FLASHES and system has not shut down:

DISPLAY Sel . . . . . DTK/STS

HLD Pb . . . . . PRESS  
(Repeatedly)

After malfunction code(s) noted and 00 appears in RH display:

To clear WRN annunciator:

HLD Pb . . . . . PRESS

HLD Pb . . . . . PRESS

CLR Pb . . . . . PRESS

HLD Pb . . . . . PRESS

After malfunction code(s) has been cleared and 00 appears in RH display:

HLD Pb . . . . . PRESS

If it is NOT desired to clear malfunction annunciation:

HLD Pb . . . . . PRESS

**POWER INTERRUPTS**

After power has been restored:

If power interrupt was less than 7 seconds:

If power interrupt was longer than 7 seconds:

Update GMT (and date if required) and update present position using PRECISION UPDATE procedure, if estimated present position has changed by more than 8 nautical miles.

WRN annunciator on STEADY, except during lamp test, indicates system has failed and is no longer operative. WRN annunciator FLASHING indicates insufficient input data by the operator, failure of a subassembly or loss of aircraft inputs.

Observe malfunction code and NAV mode in RH display. Repeatedly press HLD pushbutton (until 00 displayed) to display any additional malfunction codes; HLD will be illuminated. Record codes noted and refer to MALFUNCTION CODES TABLE for code identification and appropriate corrective action.

Press pushbutton repeatedly until HLD extinguishes. HLD illuminates. Observe RH display and annunciations remain unchanged. If no other codes present, 00 will appear. If other malfunction codes exist, next code number in numeric sequence will appear, which can be cleared by again pressing CLR, then HLD pushbuttons for each subsequent code displayed, until 00 appears. HLD and WRN will extinguish, indicating malfunction annunciation has been cleared.

Originally displayed malfunction code will appear and HLD pushbutton will extinguish.

The system will retain all data essential to resuming automatic operation after a power loss of up to 7 minutes.

During power interrupts, all displays and annunciators will be extinguished.

In flight, DR annunciator will be illuminated. On the ground, DR annunciator will be illuminated if ONS is not in 01 (NAV) mode within one minute.

DR annunciator and HLD pushbutton will be illuminated.



**MALFUNCTION CODES TABLE**

MALFUNCTION CODE	MALFUNCTION	WRN ANNUN.	CORRECTIVE ACTION
01 02 03 04 05 → 06 07	Internal system failure.  (TAS excessive or wind > 300 K)	Flashes	<ul style="list-style-type: none"> <li>For Malfunction Codes 01 thru 04, 06 and 07, system unusable; maintenance required.</li> <li>For Malfunction Code 05, if TAS excessive, accomplish "Corrective Action" for Malfunction Code 10. If wind greater than 300 knots, check reasonableness of wind.</li> </ul>
10	Loss of TAS	Flashes	Check power to CADC. If CADC C/B has not tripped, accomplish MANUAL TAS ENTRY procedures.
11	Loss of HDG.	Flashes	<ul style="list-style-type: none"> <li>Select #2 compass system using instrument transfer switch.</li> <li>If HDG input cannot be restored by switching compass systems, accomplish MANUAL HEADING ENTRY procedures.</li> </ul>
12	Loss of TAS and HDG.	Flashes	Accomplish "Corrective Action" for Malfunction Codes 10 and 11 above.
13	Power interrupt longer than 7 seconds.	Flashes	Accomplish POWER INTERRUPTS procedure.
14	No SYNC after 3 minutes.	Flashes	No action required; system will continue to synchronize. When system synchronized, SYN will extinguish.
15	Initial data entry incomplete.	Flashes	Enter missing information (present position latitude and longitude, GMT and date).
17	<ul style="list-style-type: none"> <li>System input failure.</li> <li>VOR/LOC Flag appears in CI.</li> </ul>	OFF	<ul style="list-style-type: none"> <li>Select XTK/TKE on CDU and fly aircraft keeping all zeros in LH &amp; RH displays, or appropriate Cross-Track Offset using the Autopilot in other than OMEGA mode.</li> </ul>
18	<ul style="list-style-type: none"> <li>System input failure.</li> <li>Autopilot steering inop.</li> <li>CI is still operative.</li> </ul>	OFF	Aircraft may be flown manually or using autopilot in any mode but OMEGA to follow the course bar in the CI.
19	System input failure.	OFF	<ul style="list-style-type: none"> <li>Has no effect on system operation when <u>not</u> associated with another malfunction code.</li> <li>If associated with another malfunction code, accomplish "Corrective Action" for the previously displayed malfunction code.</li> </ul>
20	System input failure.	OFF	<ul style="list-style-type: none"> <li>Has no effect on system operation when <u>not</u> associated with another malfunction code.</li> <li>If associated with another malfunction code, accomplish "Corrective Action" for the previously displayed malfunction code.</li> </ul>
21	<ul style="list-style-type: none"> <li>#1 needle on Captain's RMI is no longer reliable in OMEGA mode.</li> </ul>	OFF	<ul style="list-style-type: none"> <li>Continue normal operations using CI and Autopilot as desired.</li> <li>Do not use the Captain's #1 RMI pointer for OMEGA operation.</li> </ul>
22	<ul style="list-style-type: none"> <li>System input failure.</li> <li>Autopilot steering inop.</li> <li>CI is still operative.</li> </ul>	OFF	Aircraft may be flown manually or using autopilot in any mode but OMEGA to follow the course bar in the CI.
23	<ul style="list-style-type: none"> <li>System input failure.</li> <li>VOR/LOC Flag appears in CI.</li> </ul>	OFF	<ul style="list-style-type: none"> <li>Select XTK/TKE on CDU and fly aircraft, either manually or using the autopilot, and keep all zeros in LH and RH displays.</li> <li>#1 RMI needle on Captain's RMI will continue to show DTK if selected to VOR.</li> </ul>



OMEGA

**MALFUNCTION CODE RECALL**

Used to recall malfunction code(s) previously displayed which have not been cleared.  
NOTE: Malfunction codes 17 thru 23 cannot be cleared. WRN annunciator will not illuminate in conjunction with these codes.

To recall a malfunction code(s):

- |   |         |   |   |
|---|---------|---|---|
| DISPLAY Sel . . . . .                   | DTK/STS | → | Observe NAV mode in RH display.   |
| HLD Pb . . . . .                        | PRESS   | → | HLD illuminates and 00 appears in RH display.   |
| CLR Pb . . . . .                        | PRESS   | → | RH display and annunciations remain unchanged.  |
| HLD Pb . . . . .                        | PRESS   | → | HLD extinguishes and WRN annunciator flashes.   |
| Observe malfunction codes appear, then: |         | → | Lowest malfunction code number present will appear in RH display.   |
| HLD Pb . . . . .                        | PRESS   | → | HLD illuminates.  |
| CLR Pb . . . . .                        | PRESS   |   |   |
| HLD Pb . . . . .                        | PRESS   | → | If no other codes present, 00 will appear. If other codes exist, next malfunction code in numeric sequence will appear. Alternately press CLR and HLD pushbuttons to clear and recall any additional codes present, until 00 appears. |
| HLD Pb . . . . .                        | PRESS   | → | HLD pushbutton, WRN annunciator and 00 display will extinguish.   |

**DR LIGHT ON**

It is normal for DR light to illuminate during initialization until system achieves NAV status 02 (VLF) or 01 (Omega).

ON GROUND

If signal interference is suspected, airplane may depart gate but DR light must be out prior to takeoff if Omega is required for flight.

IN FLIGHT

- Revert to VOR, ADF or Radar Vectors, as available.

**OR**

- If no other means of navigation is available, navigate using ONS in DR mode and notify ATC.
  - Plot and record present position every 20 minutes.
  - Update winds manually using winds shown on CFP.
  - Keep ATC advised of the situation.
- If DR navigation unreliable, fly the CFP route.

DR light on in flight indicates insufficient Omega and/or VLF stations are available for navigation.

System will navigate using true airspeed, heading and winds existing at the time DR light came on. Present position will be determined without reference to Omega station radio signals. The autopilot controller mode selector will remain in the AUX NAV position, but there will be no steering output commands from OMEGA.

Refer to MANUAL ENTRIES in this section.



**National Transportation  
Safety Board**

**Memorandum**

Date: April 4, 1985

To: J. Young

From: C. Sandler *C.S.*

Subject: Information on personnel involved with Eastern Air Lines (EAL) Flight 980 on 1-1-85 at LaPaz, Bolivia.

1. Behavioral Information

A. Lawrence T. Campbell

Captain Campbell, age 49, was the captain on Flight 980 on the day of the accident. He had been the captain on EAL Flight 987 on December 31, 1984 which flew from Miami (at 1230 EST) to Asuncion, Paraguay via Guayaquil, Ecuador, Arica, Chile and LaPaz, Bolivia. That flight was his initial check flight into Guayaquil and LaPaz, with a check captain aboard.

He had arrived in Asuncion on January 1, 1985 at about 0016 AST and did not depart for LaPaz until 1840 on January 1st. Reports from people in Asuncion who saw Captain Campbell, his First Officer (F/O) and his Second Officer (S/O) during the afternoon of January 1st said that all three appeared in good spirits and were not observed to be drinking alcoholic beverages. A cab driver reported that he took the three on a sightseeing tour from about 1300 to 1700. After this, he said they changed clothes and went the airport.

On December 23rd, 1985, Captain Campbell was scheduled for and took an annual simulator check ride at EAL facilities in Miami, Florida, which he failed. He was then scheduled for a training period in the simulator on December 26th and a recheck in the simulator on December 27th. He spent December 24th and 25th at the home of some close friends, Mr. and Mrs. Paul Marino, in Ft. Myers, Florida and returned to Miami on December 26th for the simulator training and recheck on December 27th from which he received his requalification.

On December 28th, Captain Campbell was given an EAL line check on a flight from Miami to Houston which was satisfactory. The flight sequence continued to San Francisco and on December 29th, he flew from San Francisco to Atlanta via Kansas City and Milwaukee. On December 30th flew from Atlanta to Miami via

Philadelphia arriving at 1617 EST.

Interviews with the simulator instructors revealed the following information:

The instructor captain who gave Captain Campbell his first check ride in the simulator said he hadn't known Captain Campbell previously. He said that in the first half of the simulator period Captain Campbell's overall performance was borderline. The second half period was about the same and the instructor decided to give him a "down" and recommend a training period and a recheck. The instructor said that Captain Campbell did not display any temper at the failure and maintained a good attitude and agreed to the training period and recheck. The instructor said that he rarely has to "down" captains on checks, but it does happen.

A second instructor captain gave Captain Campbell his retraining period. This instructor said that the briefing, oral exam and simulator period went very well and he couldn't understand why Captain Campbell failed his check ride. He said Captain Campbell told him he was uptight during the check ride. This instructor also said he thought that the first instructor was a fair, middle roader type check instructor.

A third instructor captain gave Captain Campbell his recheck which was a standard PIC check with no emphasis on the "down" items from the preceding check. He said he noted no abnormal behavior and that Captain Campbell was generally above average and he complimented him on two of the maneuvers, however, steep turns had to be repeated because too much altitude was lost and on one approach Captain Campbell failed to disconnect the autopilot. The instructor said that Captain Campbell told him he had a bad case of "checkrideitis" and wasn't upset about the "down".

On December 2, 1984, Captain Campbell had transferred his domicile to Miami from New York (JFK). He had purchased a house next door to his friends the Marinos and had sold his last house in New Jersey which was to be settled on January 15, 1985. He had sold another house in N.J. in October 1984. He had planned to take vacation time, go to N.J. for the settlement on the house and move his possessions to his newly acquired house in Ft. Myers.

Captain Campbell had been divorced since 1980, had no children, and had moved his domicile to Miami from JFK in December 1983. In February 1984, according to the Marinos, he decided to permanently move to Miami and then transferred back to JFK so he could fix up and put his houses on the market.

He had known the Marinos in New York City prior to their move to Florida in 1979. After his divorce, Captain Campbell started visiting them in Florida and was living with them since



his move in December 1984. He was also a joint owner in the property on which the Marinos had opened an auto repair shop. Captain Campbell did not tell the Marinos about his check ride, the subsequent simulator training and recheck. He had told them early on December 24th that he was flying somewhere over Christmas and then later that day arrived in Fort Myers and told them that he had been scheduled for a South American (SA) flight for which he was not qualified and he had to advise crew scheduling of that and he would stay there for Christmas.

They said he seemed happy when he was with them, swam and bicycled with their children and was excited about his move to Florida, his first flight to (Barranquilla, Colombia) which had taken place earlier in December, and generally about his future prospects.

The Marinos said that Captain Campbell's usual routine between trips was to stay up until about 9-10 p.m. and sleep about 10-12 hours. The next day he would exercise some, work on his car and on the third day he would study IFR charts and approach plates for his upcoming flight.

Regarding his personal habits, the Marinos said that Captain Campbell ate well, took a couple of vitamin pills, drank coffee, smoked about 1 1/2 packs of cigarettes a day and did not to their knowledge consume alcoholic beverages and they never knew him to drink them.

#### B. Kenneth R. Rhodes

Mr. Rhodes, age 42, was the F/O on Flight 980 on the day of the accident. He had been the F/O on the flight to Asuncion, also. He had followed essentially the same schedule as Captain Campbell since the origination of Flight 987 on December 31st, 1984.

Mr. Rhodes flew a flight sequence which departed Miami on December 23, 1984 and returned to Miami on December 25th. Following this he had no further flights until Flight 987 on December 31st.

Mr. Rhodes lived in Miami, was a bachelor and had never been married. A close friend who had daily contact with him and who was a joint owner in a boat provided the following information:

He had known Mr. Rhodes for 13-14 years and said Mr. Rhodes had a good reputation at EAL. He said Mr. Rhodes' demeanor was normal the day before leaving for SA and he was not aware of any social engagements Mr. Rhodes had that day or for New Years Eve. He also said that he was not aware of any problems Mr. Rhodes had.

He described Mr. Rhodes as a person who was not an "eager beaver" but who would monitor the Captain when the Captain was

flying and would quickly and politely point out any errors he observed.

The friend had flown into LaPaz many times and said he had discussed with Mr. Rhodes flying around high altitude terrain and the relation of Mt. Illiamani to the airport, however, this had been about 2 1/2 years ago when EAL had acquired the SA routes.

#### C. Mark L. Bird

Mr. Bird, age 31, was the S/O on Flight 980 on the day of the accident. He had also been the S/O on Flight 987 to Asuncion on December 31st.

His next previous flight was on December 23rd when he flew a 15 flight sequence from Ft. Lauderdale, Florida which returned to Ft. Lauderdale on December 25th. For a portion of the sequence he was evaluated by a check captain and received average grades except for one above average for attitude. He was off duty from December 27th through December 29th.

Mr. Bird was married and lived in San Antonio, Texas.

#### D. Joseph B. Loseth, Jr.

Captain Loseth was the check captain who gave Captain Campbell his qualification flight check for Guayaquil and LaPaz on Flight 987, the southbound flight sequence. Captain Loseth had also completed a Proficiency Report on Mr. Bird on December 23rd on the flights from Ft. Lauderdale to Sarasota, Florida which went via Philadelphia, Pennsylvania, Boston, Massachusetts, and Tampa, Florida.

Captain Loseth was a widower, whose wife had died at the end of 1983. He lived in Delray Beach, Florida. His domicile was Miami to which he had transferred from Chicago in December 1983.

### 2. Medical Information

#### A. Captain Campbell

Captain Campbell held a First Class medical certificate which was issued on December 3, 1984. It contained the following restriction: "...Must have in possession glasses available for near vision..." EAL medical records were reviewed and the following pertinent information obtained: In November, 1983 (while at JFK) an EAL Aviation Medical Examiner (AME) was contacted by the JFK Deputy Chief Pilot (now Chief Pilot) to relay some events about Captain Campbell. Captain Campbell had been called to the Chief Pilots office for a discussion which related to a report by a F/O, who had reportedly known the Captain for some time, that Captain Campbell had been acting strangely of late. The Chief Pilot did not notice any change in him but scheduled a 3-day trip with a check captain. The check

captain reported that Captain Campbell flew well but talked continually while taxiing and below 10,000 feet. The check captain was not observed to be drinking but was observed to be taking many pills which were explained to be vitamins. The AME recommended that Captain Campbell be sent to Miami for a physical examination.

Captain Campbell did go to see the AME in early December 1983, apparently on his own and when interviewed, the AME did recall the visit. The AME said that he talked to Captain Campbell who explained the reasons for his behavior and his vitamin program. The AME didn't see anything wrong with Captain Campbell, did not try to examine him and that he took no further action.

There were no later entries in the record. Section 31 of the EAL/ALPA contract provides that a pilot is not required to submit to any unscheduled Eastern physical examination without his consent unless he is notified in writing specifying the nature and extent of Eastern's concern. This procedure was not initiated in the case of Captain Campbell.

#### B. Kenneth R. Rhodes

Mr. Rhodes held a First Class medical certificate which was issued in September, 1984 and contained the same restriction for near vision glasses as Captain Campbell's. A review of EAL medical records showed that Mr. Rhodes had been on sick leave from October 1975 until February 1976 following injuries he received in an automobile accident. Mr. Rhodes had also been on extended sick leave from October 15, 1979 until September 8, 1981 due to allergy problems.

Mr. Rhodes personnel record shows that he received a perfect attendance certificate for the years 1982 and 1983 which indicates that he had no sick leave for those years. The Pilot Master Record for December 1984 shows that Mr. Rhodes was on sick leave from December 2nd through December 10th.

#### C. Mark L. Bird

Mr. Bird held a First Class medical certificate which was issued on August 31, 1984. It contained no restrictions.

There is no indication of the use of sick leave by Mr. Bird.

#### D. Joseph B. Loseth, Jr.

Captain Loseth Held a First Class medical certificate issued on October 11, 1984. It contained the same restriction for near vision glasses as Captain Campbells.

There was no indication of recent or long periods of sick leave in Captain Loseth's records.

### 3. Operational Information

#### A. Lawrence T. Campbell

Captain Campbell held an Air Transport Pilot (ATP) Certificate with LR-Jet, DC-9 and B727 ratings. He was employed by EAL on August 26, 1963 and after his initial ratings training was domiciled in New York at Kennedy Airport. He remained there until January 1967 when his domicile was changed to Miami. In May 1970, he returned to New York and remained there until December 1983 when he again returned to Miami remaining until February 1984 when he returned to New York until December 1984 when he returned to Miami.

Captain Campbell was upgraded to captain in B727 aircraft in December 1977 and continued in that capacity to the time of the accident. As a F/O he had qualified in DC-9, B727 and L1011 aircraft.

Captain Campbell's record showed that he had received complimentary letters based on passenger reports since December 1975 and certificates for not having taken sick leave during 1982 and 1983.

There were also two operational reports, one in 1978 when he had lined up on an incorrect runway which he corrected and another in July 1979 when a tire had blown on landing. The report about the incorrect lineup was initiated by Captain Campbell.

#### B. Kenneth R. Rhodes

Mr. Rhodes held a Commercial Pilot certificate and he was employed by EAL on November 23, 1970. After training he was domiciled in New York at JFK as a S/O in B727's. All recurrent and proficiency checks indicated that he was an above average to excellent S/O. In August 1973 he changed his domicile to Miami and was upgraded to F/O. In December 1973 he returned to JFK until December 1974, when he went back to Miami. He requalified for B727's in September 1981 following his absence on sick leave. His last proficiency check was on December 15, 1984 which was satisfactory.

Mr. Rhodes had no previous flying experience in SA.

#### C. Mark L. Bird

Mr. Bird held Flight Engineer and ATP certificates and was employed by EAL on October 10, 1984 and completed his initial S/O training on November 28, 1984. He was domiciled in Miami and had completed one month of line flying. He had no previous experience with EAL flying in SA.

D. Joseph B. Loseth, Jr.

Captain Loseth held an ATP Certificate, with DC-9 and B727 ratings, and was employed by EAL on December 13, 1965 and after initial training was domiciled at JFK. In July 1967 he transferred to Chicago (ORD) until December 1973 when he returned to JFK. In May 1974 he transferred to Miami until July 1978 when he returned to Chicago. In December 1978 he again went to Miami until August 1979 when he returned to Chicago. His final move was in December 1983 when he transferred back to Miami.

In February 1984, Captain Loseth was approved as a Temporary Check Airman, Captain and First Officer, to perform annual line checks on B727 aircraft and supervise "Appendix H Initial Operating Experience" on B727 aircraft. He continued in that capacity for the ensuing months.

His most recent proficiency check was completed on December 20, 1984 and was satisfactory.

Captain Loseth had flown into SA 5 times in 1984 and had not prior to flight 987 flown into LaPaz since April 5, 1984. He had flown into Guayaquil on December 29 and 30, 1984.

E. Training Materials

EAL maintains a library of videotapes covering various airfields including LaPaz. These are "self-service" and can generally be viewed at the pilots convenience. It is not known whether Captain Campbell reviewed the LaPaz videotape prior to the trip.

Date : March 18, 1985  
To : Jack Young, AI-30  
From : Bob Watson, TE-20  
Thru : Chief, Aviation Engineering Division  
Subject: Systems Group Investigation of EAL Flight 980

On January 3, 1985, the Systems Group was formed in La Paz, Bolivia. The group members are listed below:

Robert A. Watson	Systems Group Chairman NTSB Washington, D.C.
Hugh M. Black	Principal Inspector, Avionics Federal Aviation Administration
Andres A. Fraga	Chief Avionics Engineer Eastern Airlines

The Systems Group discussed the navigation equipment on board the 727-225 airplane, and also the navigation aids available along the route of flight. A copy of the computer generated flight plan, for use between Asuncion, Paraguay and La Paz, Bolivia, was reviewed. The longitude and latitude coordinates listed for each waypoint on the flight plan were compared to the coordinates shown on the appropriate en route navigation charts. All coordinates were in agreement.

The coordinates listed for each waypoint on the flight plan are used to program the airplane's on board OMEGA navigation system. The accident airplane was equipped with the Litton Model LTN-211 OMEGA/VLF Navigation System. This system consists of three units: (1) the receiver processor unit, (2) control display unit, and (3) the antenna coupler unit. The control display unit (CDU) is mounted in the cockpit and is used by the flightcrew to program the system and to read out the desired navigation information. The flight plan generated for the flightcrew contains the necessary information in order to program the OMEGA system for the route to be flown. The flightcrew use the data keyboard on the CDU to enter the latitude and longitude coordinates as shown in the order listed on the flight plan. The coordinates of the departure and destination airports are also entered. Once this information is entered into the system, the Receiver Processor Unit (RPU) automatically selects three appropriately located OMEGA ground stations (There are eight stations located worldwide) in order to provide accurate navigation data along the route of flight. If three OMEGA ground stations can not be received, then the RPU will accept VLF ground station transmissions in order to solve the navigation problem. (There are nine VLF stations located worldwide.) Once the OMEGA system has been initialized by receiving all data previously discussed, the unit is capable of providing many types of navigation data to the flightcrew, such as continuous position readout in latitude and longitude, annunciation to alert the flightcrew when approaching a waypoint, displayed heading to

destination direct or next selected waypoint, ground speed, and distance between waypoints as well as estimated flying time between waypoints. The OMEGA system can also be used to provide steering information to the autopilot and display information to the horizontal situation indicator for crosstrack deviation and course reference.

The accident airplane was also equipped with two standard VHF navigation receivers which will display course deviation on the appropriate horizontal situation indicator (NAV 1 on captain's HSI and NAV 2 on First Officer's HSI). The VHF navigation system will also provide steering signals to the autopilot system.

The last position report made by the flightcrew of Eastern Flight 980 was crossing DAKON intersection. This intersection can be identified by various methods. The OMEGA system could identify the intersection if the appropriate data were entered. The VHF navigation system could identify the intersection by using two possible methods: (1) If DME signals are available from the La Paz VOR station, the intersection could be identified by observing the appropriate displayed distance from La Paz in combination with the appropriate VOR radial track displayed on the HSI, and (2) the appropriate radial tracks from the La Paz and Cochabamba VOR stations could be compared for position relative to the intersection.

Since access to the airplane wreckage was not possible due to the altitude and terrain conditions, the navigation system(s) used by the flightcrew of Flight 980 could not be determined. The Systems Group departed La Paz on January 6.

On January 7, 1985, the Systems Group reconvened at the Eastern Airlines maintenance facility located at the Miami International Airport. The group reviewed maintenance records pertaining to the navigation equipment installed in the accident airplane. The records reviewed covered the period from January 15, 1984, up to the date of the accident. The records reviewed revealed only one reported discrepancy of the VHF navigation system. On December 23, 1984, the No. 2 VHF navigation receiver was replaced due to the Omni bearing differing from the No. 1 system by 7 to 10 degrees.

The maintenance records reviewed revealed 13 discrepancies involving the OMEGA navigation system. The anomaly, as described in the flight log entry, could not be duplicated for 6 of the 13 discrepancy writeups. A total of 7 component changes were made as a result of discrepancy writeups. The receiver processor unit was changed 5 times, and the control display unit and antenna coupler unit were each changed once. The last time a component of the OMEGA system was changed was June 4, 1984, when the receiver processor was changed as a result of a discrepancy indicating poor signal quality on received station.

The Systems Group also discussed the signal quality of available OMEGA ground station reception between Asuncion, Paraguay, and La Paz,

Bolivia. Interviews with other Eastern flightcrews and representatives of the U.S. Coast Guard OMEGA navigation System Group revealed that there is adequate signal strength from at least three OMEGA ground stations to provide accurate navigation data in that area of the country.

The Systems Group also reviewed FAA Advisory Circular AC 20-101B dated December 1, 1980. The Advisory Circular mentions that the OMEGA system should not be used as the primary source of navigation. A cross check should be made between OMEGA and VHF navigation systems whenever the airplane is within range of the appropriate ground station coverage. OMEGA equipment may only be used for en route area navigation. Also the system is not to be used for navigation in terminal areas, during departures from or approaches to airports, into valleys between peaks in mountainous terrain, or below minimum en route altitude (MEA).

  
Robert A. Watson





**National Transportation  
Safety Board**

**Memorandum**

Date: MAR 28 1985

To: John Young (AI-30)

From: Gregory Salottolo (TE-30)

Subject: Meteorological Factual Report of the Accident Involving an Eastern Airlines B727 near La Paz, Bolivia (SLLP) on January 1, 1985

1. A surface weather analysis was prepared by the weather office at SLLP for 0000Z. The analysis showed a low pressure area located to the southeast of SLLP (see attachment 1).

2. The following SLLP surface weather observations were made by World Meteorological Organization certified weather observers at the following times:

2300Z - 4/8 stratocumulus at 600 meters, 1/8 cumulonimbus at 800 meters, 3/8 altostratus at 2400 meters, 5/8 cirrus at 7,000 meters, visibility 25 kilometers, (95TS) thunderstorm, slight or moderate with rain, temperature 9.4°C, dew point 3.6°C, wind 090° at 10 knots, altimeter setting 1034.3 millibars, thunderstorm slight or moderate with rain (95TS) began at 2235Z ended at 2335Z.

0000Z - 3/8 stratocumulus at 500 meters, 1/8 cumulonimbus at 750 meters, 3/8 altostratus at 2400 meters, 5/8 cirrus at 7,000 meters, visibility 30 kilometers, (17TS) thunderstorm but no precipitation, temperature 7.4°C, dew point 3.8°C, wind 080° at 12 knots, altimeter setting 1034.8 mb, cumulonimbus/thunderstorm/lightning/southeast

0100Z - 4/8 stratocumulus at 510 meters, 3/8 altostratus 2100 meters, visibility 30 kilometers, (code 13) lightning visible no thunder heard, temperature 7.4°C, dew point 3.8°C, wind 060° at 10 knots, altimeter setting 1035.2 millibars, lightning west/southeast. Weather observations are made at the northwest corner of the airport.

3. The following surface weather observations for SLLP were in the Eastern Airlines Systems on January 1 and 2:

2100Z - 4/8 cumulus at 2,000 feet, 3/8 altostratus at 8,000 feet, 5/8 cirrus at 23,000 feet, visibility greater than 6 miles, temperature 12°C, dew point 4°C, wind 090° at 08 knots, altimeter setting 1033 millibars.

2300Z - 4/8 stratocumulus/cumulus at 600 meters, 1/8 cumulonimbus at 600 meters, 3/8 altostratus at 2400 meters, 5/8 cirrus at 7,000 meters, visibility unlimited, temperature 9°C, dew point 4°C, wind 090° at 10 knots, altimeter 1034.0 millibars.

0000Z - 3/8 stratocumulus at 500 meters, 1/8 cumulonimbus at 750 meters, 3/8 altostratus at 2400 meters, 5/8 cirrus at 7,000 meters, visibility 10 kilometers, temperature 7°C, dew point 4°C, wind 080° at 08 knots, altimeter setting 1035.0 millibars.

Note: The following were recorded on the surface weather observations form for SLLP but not included in the observations for SLLP available through the Eastern Airlines System:

2300Z - Present weather, thunderstorm with slight or moderate rain.

0000Z - Present weather, thunderstorm, remarks, cumulonimbus/thunderstorm/lightning/southeast

4. The following information was obtained by phone from the Naval Observatory in Washington, D. C. on January 22:

Location: La Paz, Bolivia  
Quarter Moon December 30, 0528Z  
Full moon January 7, 0216Z  
Moon rise 1832Z on January 1  
Moon set 0617Z on January 2  
At 0040Z on January 2: Altitude of Moon 59°, Azimuth of moon 353° true.

5. National Meteorological Center Forecast Winds valid at 0000Z on January 2, 1985 are as follows:

Wind Direction<sup>O</sup>/Wind Speed (knots)

<u>Lat/Lon</u>	<u>200MB</u>	<u>250MB</u>	<u>300MB</u>	<u>400MB</u>	<u>500 MB</u>
15/70	010/16	330/08	020/06	050/12	040/10
20/70	300/40	290/27	300/17	350/14	360/12
22.5/70	280/50	280/39	290/28	310/20	-
15/65	150/17	160/15	130/09	060/10	050/09
20/65	250/32	250/20	250/14	240/07	210/01
22.5/65	260/43	260/29	270/23	270/14	-
15/60	200/08	180/09	170/08	110/05	-
20/60	250/20	260/12	240/10	220/14	-
22.5/60	270/26	280/23	280/18	220/13	-
25/65	260/50	270/39	280/32	300/23	-
25/60	280/35	290/37	280/33	240/14	-
27.5/60	300/46	290/49	280/48	250/22	-
27.5/55	280/48	270/52	260/43	220/28	-
25/55	280/26	270/32	250/28	210/18	-
22.5/55	250/14	260/15	250/15	230/13	-

Lat/Lon - Latitude/Longitude (°S/°W)  
MB - Millibar

Note: Attachment 2 contains a plot of the upper winds

6. The 500 MB analysis prepared by the National Meteorological Center in Camp Springs, Maryland valid at 0000Z on January 2, 1985 showed wind speeds less than 10 knots for an area southeast of SLLP (see attachment 3)

The 250 MB analysis prepared by the National Meteorological Center in Camp Springs, Maryland valid at 0000Z on January 2, 1985 showed wind speeds near 10 knots for an area southeast of SLLP (see attachment 4)

7. National Meteorological Center Forecast Temperatures valid at 0000Z on January 2, 1985 are as follows:

<u>Lat/Lon</u>	<u>Temperatures (°C)</u>				
	<u>200 MB</u>	<u>250MB</u>	<u>300MB</u>	<u>400MB</u>	<u>500MB</u>
15/70	-54	-42	-32	-16	-4
20/70	-54	-42	-32	-16	-4
22.5/70	-54	-43	-34	-17	-4
15/65	-53	-41	-32	-17	-5
20/65	-54	-41	-32	-17	-
22.5/65	-54	-42	-33	-17	-
15/60	-52	-40	-32	-17	-6
20/60	-53	-41	-32	-17	-
22.5/60	-53	-41	-32	-17	-
25/65	-55	-43	-34	-18	-
25/60	-54	-42	-33	-17	-
27.5/60	-54	-43	-35	-18	-
27.5/55	-52	-42	-34	-19	-
25/55	-52	-41	-32	-18	-
22.5/55	-52	-41	-31	-17	-

8. The weather observer who came on shift at 0000Z was interviewed in person on January 5. The following is a summary of that interview.

At 2000 (local time) the observer observed a cumulonimbus to the southeast. The observer estimated the azimuth of the cumulonimbus from the weather observation site to be 120° to 135°. Lightning was visible in the cumulonimbus. The observer estimated the storm to be of moderate intensity. The lightning flash rate was about 3 per 5 minute interval. The observer could not estimate how far the cumulonimbus was from the airport. At 0040Z a dissipating thundershower was observed southeast of the field.

The weather observer on duty prior to 2000 (local time) was interviewed in person on January 5, 1985. The following is a summary of that interview:

At approximately 2000 (local time) a cumulonimbus was located at approximately 120° from the weather observation site. The distance of the cumulonimbus from the airport could not be determined. Lightning was seen and thunder was heard at the weather observation site. The intensity of the cumulonimbus southeast of the airport could not be determined. The cumulonimbus southeast of the airport passed over the airport earlier. The intensity at that time was moderate. The cumulonimbus was slow moving (less than 15 knots).

9. The terminal forecast for SLLP prepared by the Forecast Office at SLLP and issued at 2200Z is as follows for the following time interval.

0000Z to 1200Z - 2/8 stratus at 1500 feet, 3/8 stratocumulus at 2,000 feet, 3/8 altostratus at 7,000 feet, visibility greater than 10 kilometers, tempo (40 BCFG/50DZ) fog patches/drizzle.

NOTE: Tempo - changes are expected to be different from the prevailing forecast conditions for a period of less than 1 hour in each instance.

The terminal forecast for SLLP prepared by the Forecast Office at SLLP and issued at 1050Z is as follows for the following time interval.

1200Z to 0000Z - 1/8 stratus at 700 feet, 3/8 stratocumulus at 1,500 feet, 4/8 altostratus at 7,000 feet, visibility greater than 10 kilometers, tempo (59/60RA) drizzle and rain moderate or heavy/rain intermittent, slight.

There were no advisories for turbulence or icing issued by the Forecast Office at SLLP valid at the time of the accident.

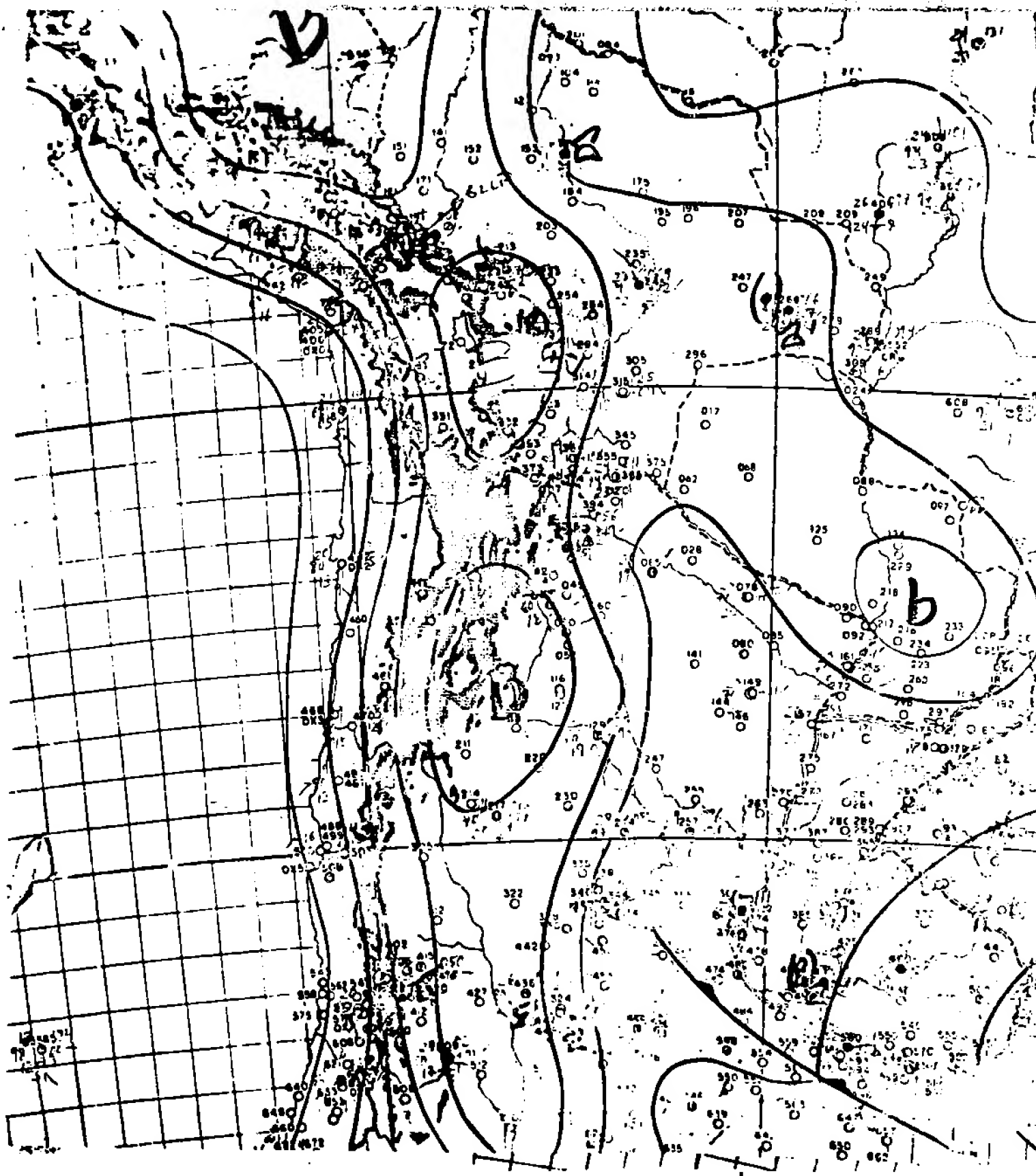
10. The Manager of the Meteorology Department at Eastern Airlines was interviewed in person on January 24, 1985. Present during the interview was Barry L. Trotter of Eastern Airlines. The following is a summary of that interview.

Eastern Airlines Meteorologists do not make weather forecasts for South America. Eastern Airlines Meteorologists rely on the weather forecasts produced by the respective countries in South America. Weather forecasts and weather operations bulletins (for significant weather) are produced by Eastern Airlines Meteorologists for the domestic operation. Winds and temperatures forecasts for South America used by Eastern Airlines are produced by the National Meteorological Center in Camp Springs, Maryland. Eastern Airlines Meteorologists do not update either the winds or the temperatures for the South American operation. Winds and temperatures are updated for the domestic operation. A reevaluation of Eastern Airlines Meteorological support for the South American operation is presently underway. Braniff Airlines meteorologists did weather forecasting for South America when Braniff was flying in South America.

11. A copy of a Full Disc Infrared Satellite Photograph for 0030Z covering South America is included in Attachment 5.

12. On January 5, 1985, a list of followup questions for the observer on duty at the time of the accident was supplied to Jose Flores, Chief Meteorologist. As of this date written answers to these questions have not been received.





6-1-85 GMT 0000

4-1-85

Attachment 1

# National Meteorological Center Forecast Winds Valid 0000Z January 2, 1985.

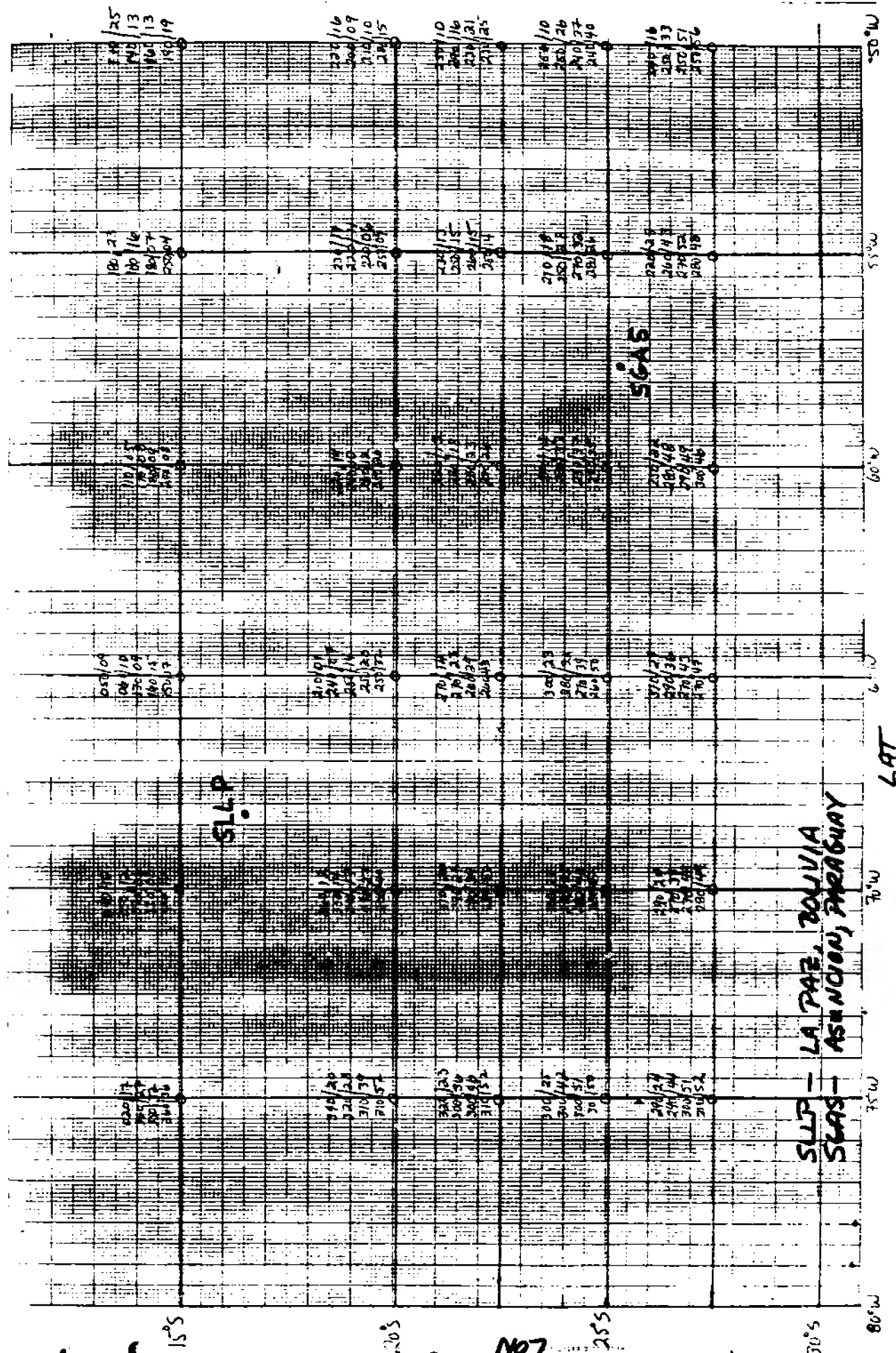
## LEGEND

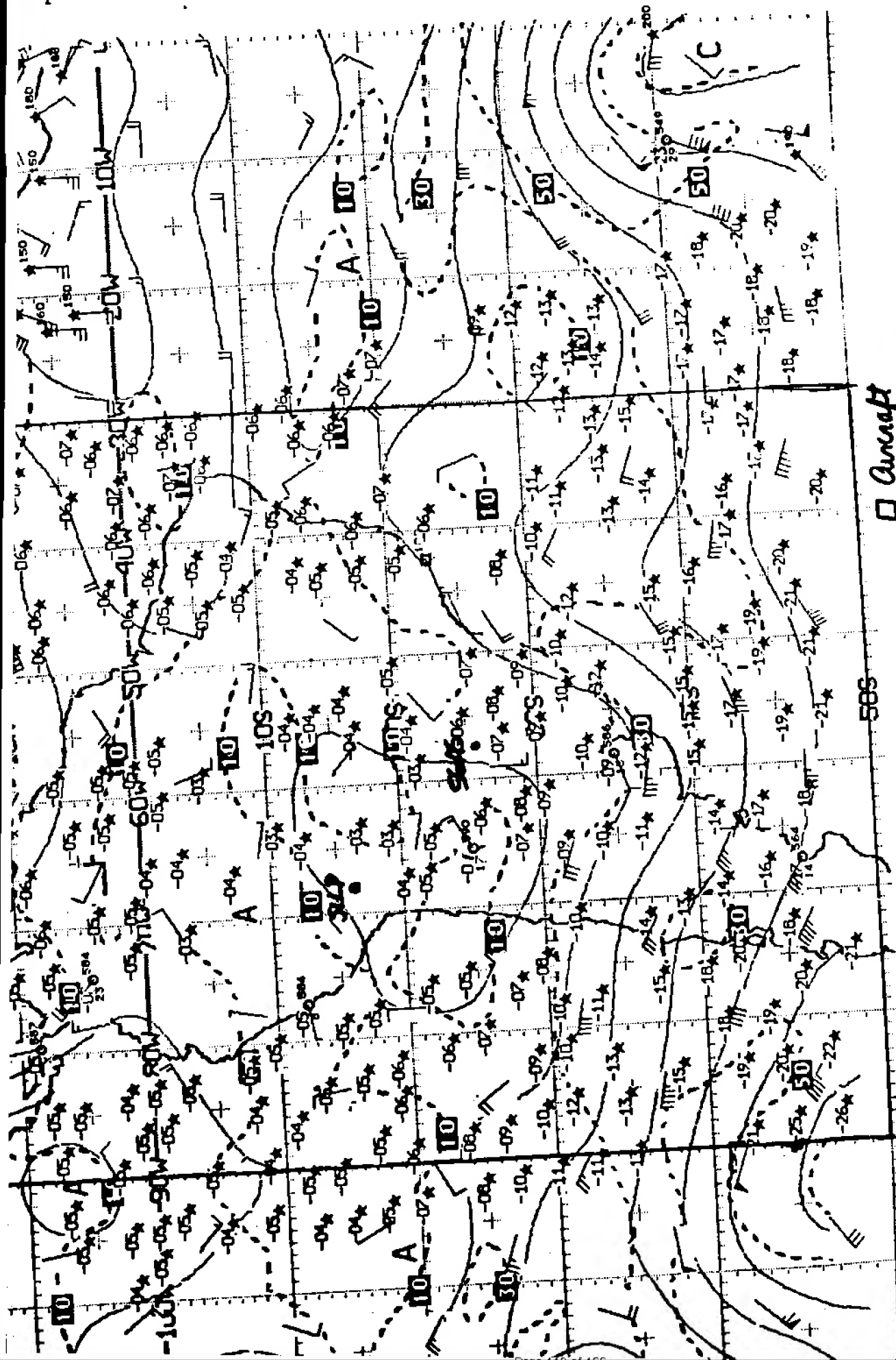
Wind Direction / Wind Speed	500 MB
Wind Direction / Wind Speed	400 MB
Wind Direction / Wind Speed	300 MB
Wind Direction / Wind Speed	250 MB
Wind Direction / Wind Speed	200 MB



Wind Direction ° true  
Wind Speed Knots



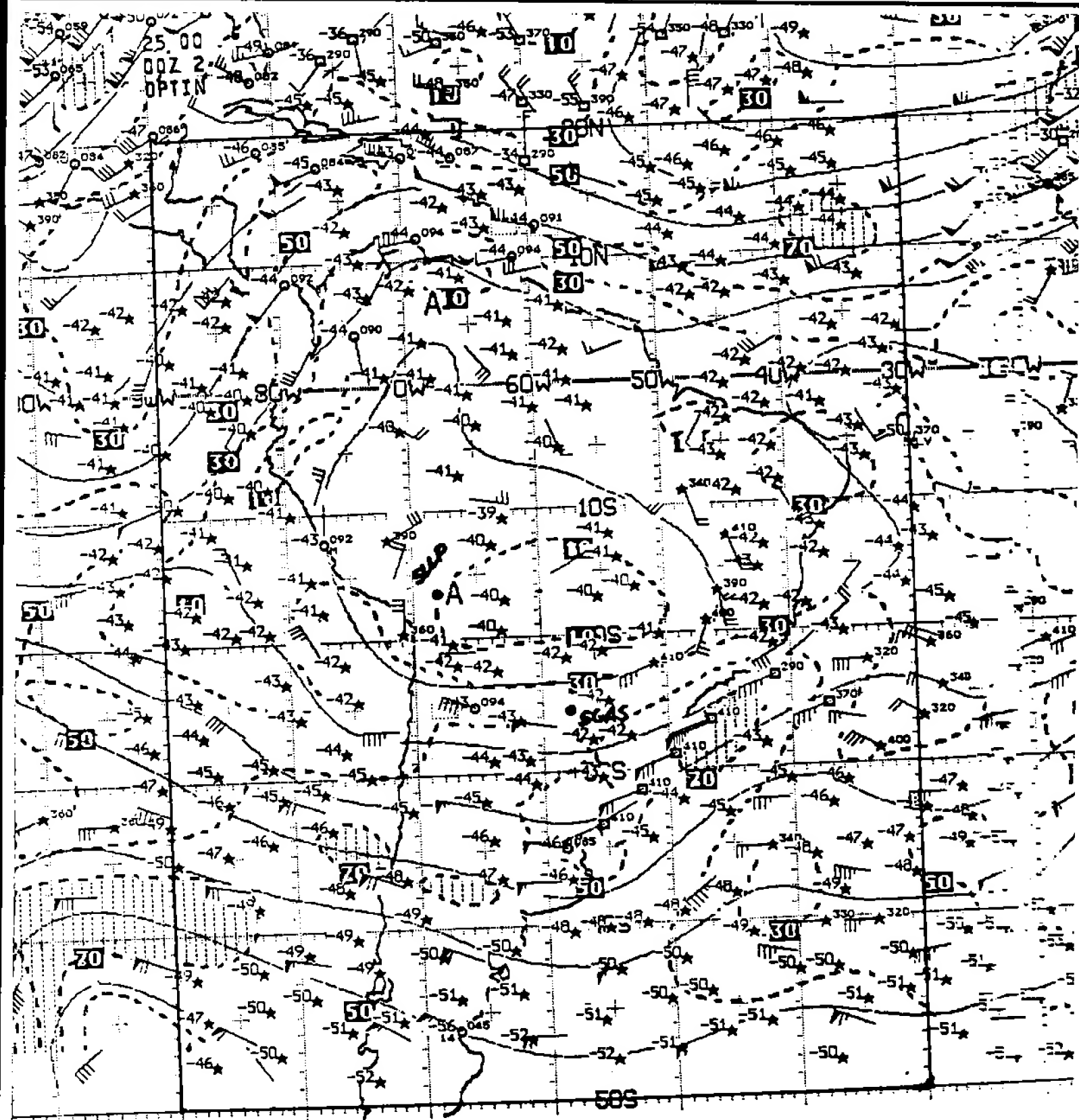




□ Aircraft  
 ☆ Satellite  
 ○ Radiosonde  
 ||| Analyzed Gridpoint Value

500 MB Analysis  
 00Z 2 JAN 1985

Attachment 3



250 MB Analysis

00Z 2 JAN 1985

- Aircraft
- ☆ Satellite
- Radiocade
- Analyzed Gridpoint Value

Attachment 4

111



XSLP

in 65  
1/2/85 0030Z  
Attachment 5



**National Transportation  
Safety Board**

**Memorandum**

Date: July 15, 1985

To: Mr. John Young, AI-30

FROM: Nathaniel Lucas, Aerospace Engineer, TE-20  
THRU: Chief, Aviation Engineering Division

Subject: Structures Group Investigation of Eastern Airlines (EAL) Accident, Flight 980, N819EA (QA685), Boeing 727-225

On January 3, 1985, the Structures Group was formed in La Paz, Bolivia. The Group Members were:

N. Lucas	Structures Group Chairman National Transportation Safety Board Washington, D.C.
D. Leppard	Air Safety Investigator Air Lines Pilots Association
M. Broyard	Chief Structures Engineer Eastern Air Lines Miami, Florida

The group assembled in preparation for the accident investigation of EAL Flight 980, Boeing 727-225. The airplane crashed New Year's day, killing all 29 people aboard, into Mount Illimani at approximately 19,600 feet elevation. Aerial surveillance revealed a trench where the airplane crashed into deep snow, and bits and pieces of the airplane itself. (See photographs A, B, C, A-1, A-2, B-1 to B-8, C-1, and C-2.) A preliminary description from an officer on one of the surveillance flights and from the photographs, indicated that the area in which the airplane crashed was on an approximately 30 percent slope. Because of severe weather, extremely difficult topography, and the scatter and burying of airplane wreckage, gaining accessibility to the wreckage site was virtually impossible. Therefore, the Structures Group decided to adjourn, and to reassemble at the EAL Maintenance Facility, Miami, Florida, January 7, 1985, to evaluate maintenance records.

On January 7, 1985, the Structures Group, less Mr. D. Leppard, who remained in Bolivia to monitor the efforts and findings of the rescue teams from a structural investigation perspective, reassembled at the EAL Maintenance facility. Others who were present were Mr. Robert E. Witt, I.A.M. and Mr. John W. Gill, Manager, Reliability. The group examined and obtained materials on Service Difficulty Reports, Engineering Changes and Modifications, Aircraft Logs and Records, Manufacturing Service Bulletins, Maintenance Practices, and Airworthiness Directives. The materials were brought back to NTSB for further evaluation and examination by the Structures Group Chairman.

After further evaluation and examination, the following information was found.

A. Service Difficulty Reports

The Service Difficulty Reports were retrieved from the Federal Aviation Administration's National Safety Data Branch in Oklahoma. The time frame was from 1979 to 1985. There were only 3 records of service difficulty data for N819EA. They were the tripping off of galley power due to 12 galley power wires burned in half behind the No. 1 general control panel, an intermittent nose landing gear light, and a replacement of the landing gear accessory module. None of the above are directly significant to this accident.

B. Engineering Changes and Modifications

Of the engineering orders reviewed, there were six of interest to the Structures Group Chairman. These six engineering orders were Nos. C27JM-B350-1, CHECK/ADJUST CHAIN TENSION, STABILIZER TRIM SYSTEM FORWARD MECHANISM, C55FW-D249-1, LEFT HAND ELEVATOR REAR SPAR CHORD MODIFICATION, C55FW-D249-1, RIGHT HAND ELEVATOR REAR SPAR CHORD MODIFICATION C57FW-D037-1A, LEFT HAND INBOARD MID FLAP, INBOARD AFT PULLEY BRACKET SUPPORT RIBS, C57FW-C167-1A, LEFT INBOARD SPOILER ACTUATOR SUPPORT FITTING, AND C57FW-C167-1A, RIGHT INBOARD SPOILER ACTUATOR SUPPORT FITTING. No. C27JM-B350-1 purpose was to reduce chain deflection on the stabilizer trim system forward mechanism to 0.25+ 0.07 inch. This order was accomplished December 29, 1982. No. C55FW-D249-1A, Left and Right Elevator Rear Spar Chord Modification, dealt with spar chord cracking. The cracks were located in the upper and lower chord's radius at the control tab hinge fittings. The cracks were in the 2024-T3 aluminum chords 1.0 to 4.0 inches long. According to the engineering order, the cracks were attributed to fatigue probably caused by shear plate edges riding the spar radius at the elevator control tab hinge fitting locations. The engineering order was issued to authorize the inspection, repair (if necessary), and preventive modification for cracking in the left and right elevator rear spar chords. This engineering order was accomplished on N819EA December 17 and 18, 1984. No. C57FW-D037-1A engineering order was issued to repair a crack in the inboard aft pulley bracket support ribs in the left

inboard mid flap. This engineering order was accomplished February 7, 1984. No. C57FW-C167-1A engineering order was issued to also repair cracks in the lower spar chords at the inboard ground spoiler actuator support fittings. This engineering order had not been accomplished on N819EA, and had been scheduled, according to EAL's Chief Structures Engineers, on the Next "C" Check, which would have been at some time in 1985.

#### C. AIRCRAFT LOGS AND RECORDS

The logs and records appeared to be in order. All outstanding items were completed, and/or were of no significance to the probable cause to the accident.

#### D. MANUFACTURING SERVICE BULLETINS

The applicable structurally related manufacturing Service Bulletins were obtained from Boeing company. They are:

<u>Number</u>	<u>Title</u>	<u>Date</u>	<u>Revision No.</u>
27-151	Flap Drive Transmission Seal	10/29/82	3
27-162	Elevator Power Control Units	8/27/76	1
27-180	Stabilizer Trim Actuator Ball Nut	1/15/82	3
27-201	Hydraulic System Modular Unit	12/18/81	
27-208	Elevator Feel and Centering Unit	2/06/81	
27-209	Leading Edge Slat Actuator	8/27/82	1
27-211	Flight Spoiler Actuator Seal	7/02/81	
27-215	Leading Edge Flap Position	8/12/83	
27-216	Flight controls-Flap, Trailing	3/02/84	
27-218	Horizontal Stabilizer Trim Control	?	
53-148	Application of Antistatic Finish	7/14/78	
53-162	Fuselage--BS 930, Upper ?	10/05/84	
53-165	Fuselage--BS 910, and ?	6/29/84	
55-65	Elevator Balance Panel Hinge	7/13/76	
55-83	Horizontal Stabilizer Rear Spar	?	
55-84	Fin-To-Rudder Seal Support	10/01/82	
55-85	Stabilizer-Elevator Rear Spar	12/21/84	2
57-120	Main Landing Support Beam Rework	7/09/71	1
57-153	Main Landing Beam To ?	10/08/82	

57-158	Inboard Spoiler Actuator Support	1/14/83	
57-159	Outerwing Upper Stringer	3/30/84	2
57-165	Inboard Fore Flap and Body Roller	3/25/83	
57-167	Main Landing Gear Outboard	8/31/84	1
57-168	Wing Trailing Edge Rib	12/16/83	
57-169	Wing - Outboard Aileron Tab Hinge	5/11/84	
57-170	Wing - Center Wing Box Inspection	3/22/84	


The Service Bulletins incorporated in N819EA are provided as Attachment 1. These were obtained from EAL.

E. MAINTENANCE PRACTICES

All maintenance practices observed and materials examined were consistent with FAA standards.

F. AIRWORTHINESS DIRECTIVES

The Airworthiness Directives incorporated in N819EA are provided as Attachment 2. These were obtained from EAL.

  
Nathaniel Lucas  
Aerospace Engineer

Attachment



N8819EALISTING OF APPLICABLE BAC SERVICE BULLETINS

<u>S/B NUMBER</u>	<u>DATE</u>	<u>EAL E.O. NUMBER</u>	<u>ACCOMPLISHMENT</u>
727-35-23	10/7/82	820-35-2701-1B	4/9/82
727-57-167	9/18/84	C57FW-D205-1	12/20/84
727-24-74	2/28/84	C24ED-D081-1A	10/31/84
727-25-277	4/10/84	C25TH-D118-1A	12/20/84
727-28-51	10/31/83	C28JP-C087-1	12/20/84
727-32-0274	11/5/84	C32JA-D066-1B	7/29/84
727-32-321	10/22/84	C32JAD066-1B	7/29/84
727-55-085	10/9/84	C55FW-D249-1A	12/20/84

JWG:cmv  
6/20/85

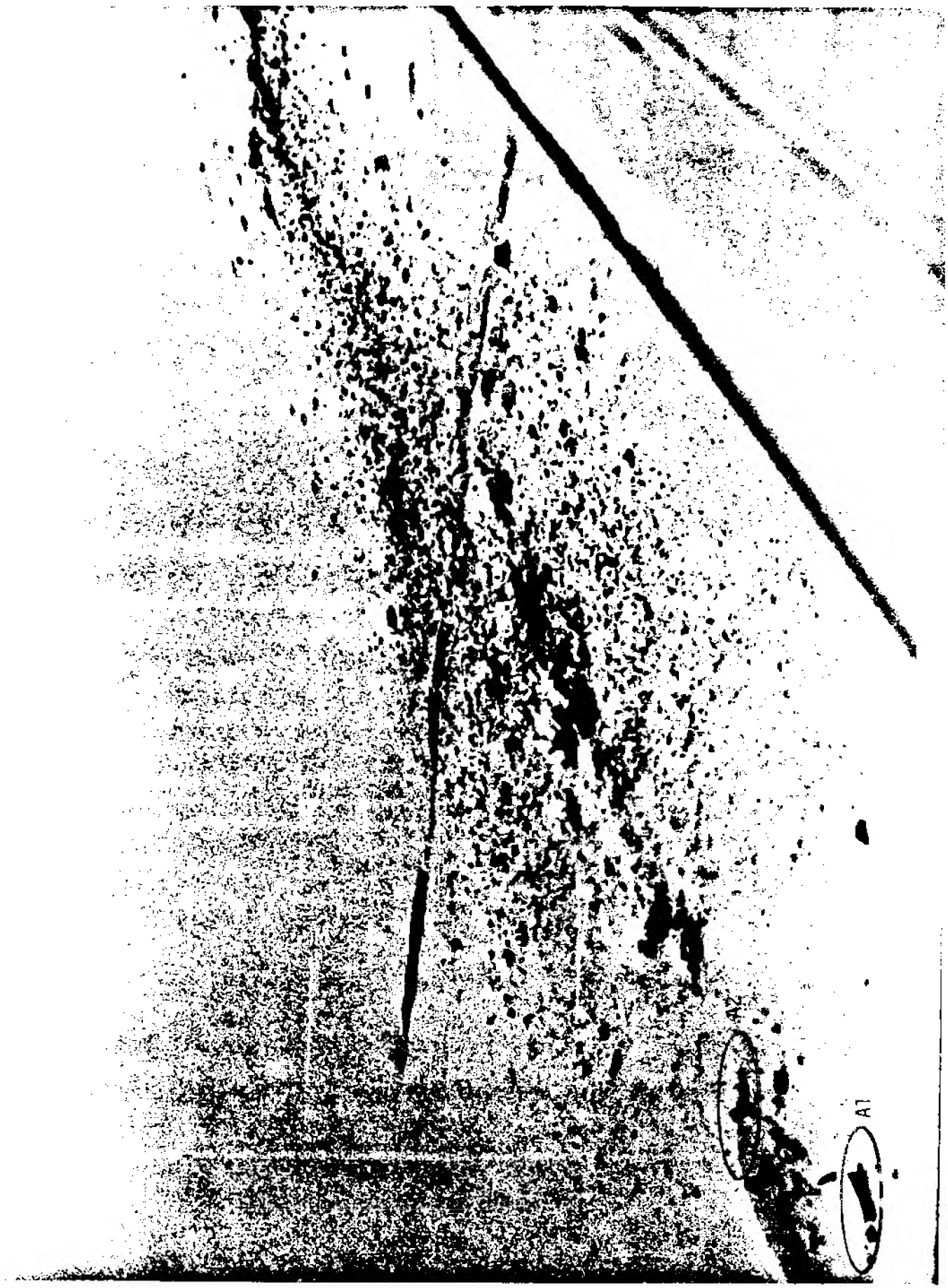
ATTACHMENT II

N8819FA  
LISTING OF APPLICABLE AIRWORTHINESS DIRECTIVES  
THRU MAY 2, 1985

<u>A/D NO.</u>	<u>AMND NO.</u>	<u>EFF. DATE</u>	<u>EAL E.O. NO.</u>	<u>MTCE REF BAC S/B#</u>	<u>ACCOMPLISHMENT</u>
81-17-07	39-4194	81/09/25	C53FB-B015-1A B727	BAC 53-82	COMPLETED 12/28/84
83-01-05	39-4542	83/02/28	C80NR-C032-1F B727	N/A	COMPLETED 12/20/84
83-02-08	39-4548	83/03/03	C53FB-B141-1B B727	BAC 53-68	COMPLETED 12/28/84
83-11-03	39-4662	83/07/18	B25DK-B256-1A B727	1107261-25-01	COMPLETED 3/16/83
84-04-01	39-4570	83/03/31	C57FB-A260-1C B727	BAC 30-055	SCHEDULED FOR "D" CHECK IN 1990.
84-16-03	39-4897	84/10/25	B70NW-9300-1K B727	P & W 5510	DUE AT ENGINE OVERHAUL EST. IN 1987
84-16-03	39-4897	84/10/25	B72NS-D123-1C B727	P & W 5510	DUE AT ENGINE OVERHAUL EST. IN 1987
84-21-05	39-4920	84/10/22	C51FW-D272-1A B727	N/A	PROGRAM SCHEDULED TO COMMENCE 10/85
84-22-02	39-4951	84/11/21	C55-FWD249-1A B727	BAC-55-0085	COMPLETED 12/20/84



PHOTOGRAPH A: AN AERIAL OF THE REEF



PHOTOGRAPH A: AN AERIAL OF THE WRECKAGE

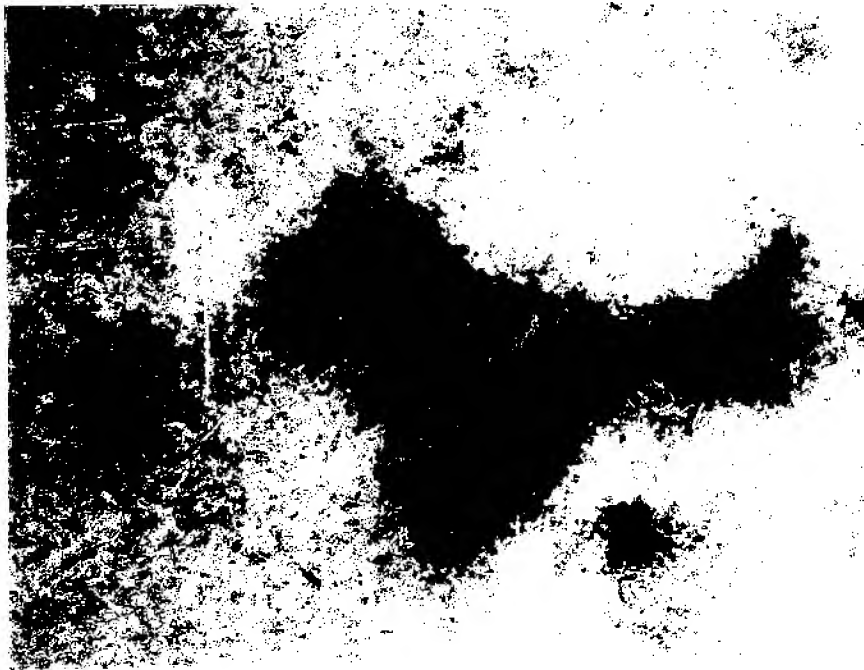


PHOTO A1: ENGINE



PHOTO A2: WING CONTROL SURFACE

B5



PHOTOGRAPH B: AN AERIAL OF THE MOUNTAIN





B1

PHOTO B1: NO. 2 ENGINE EXHAUST



B2

PHOTO B2: WING CONTROL SURFACE





PHOTO B3: FUSELAGE SECTION

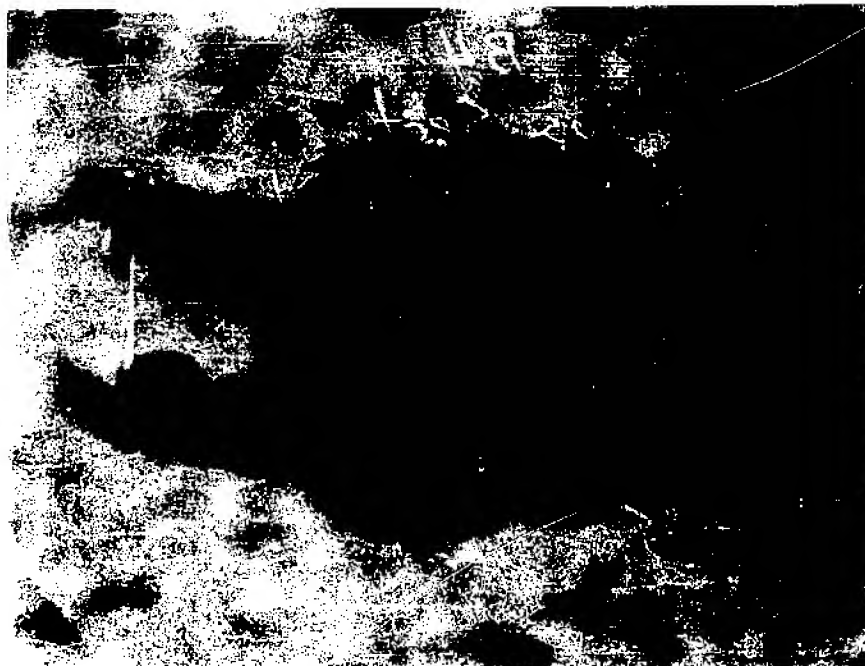


PHOTO B4: FUSELAGE SECTION,  
SPREADED OUT



34

PHOTO B5: TAIL SECTION

78



PHOTO B6: SIDE ENGINE COWLING



PHOTO B7: SIDE ENGINE COWLING



PHOTO B8: MAIN LANDING GEAR(MLG)



PHOTOGRAPH C: AN AERIAL OF THE WRECKAGE

The image is a vertical, high-contrast black and white scan. It is characterized by extreme noise and a grainy texture, suggesting a severely degraded or damaged document page. There are no legible characters, words, or identifiable figures present. The dark, irregular shapes and speckles are distributed across the entire frame, with a slightly denser concentration towards the bottom.

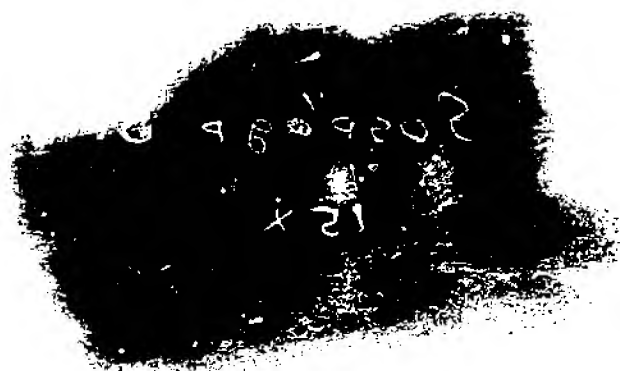


PHOTO 01: NOSE LOG SECTION



PHOTO 02: TAIL SECTION

RCV MSG # TIME RADAY . . . **NTSB** . . . IMMEDIATE  
02310 2001 023/85  
05T PHMA FRA MHTSA UNTA RSPA CORR MAR 230 MAR 740 MAR 742 MAR 743  
DET-1 OIC RM 7214 RM 2122 RM 2119 RM 2117  
MARAD TELECOMMUNICATIONS RM P1-1303 PH 382-6108/09 TUX 710-822-9424 MARAD WSI

OTTUZYUW RUEHLP00562 0231959-UUUU--RUEGGBA.

ZNR UUUUU ZZN

O 231957Z JAN 85

FM AMEMBASSY LA PAZ

TO RUEHC/SECSTATE WASHDC IMMEDIATE 3759

INFO RUEGGBA/FAA WASHDC

RUNTEAR/FAA AERO CNTR OKLAHOMA CITY OK

RHCGGIL/FAA ATLANTA

RUESBG/AMEMBASSY BOGOTA 3144

RUEHBU/AMEMBASSY BUENOS AIRES 6162

RUEHBE/AMEMBASSY BRASILIA 3386

RUESAS/AMEMBASSY ASUNCION 3170

RUEHCY/AMEMBASSY CARACAS 4093

RUEHPE/AMEMBASSY LIMA 0931

RUESOI/AMEMBASSY QUITO 3034

RUESNA/AMEMBASSY SANTIAGO 5696

BT

UNCLAS LA PAZ 00562

FAA WASHDC ALSO PASS TO NTSB WASHDC - JACK YOUNG

E.O. 12356: N/A

TAGS: EAIR, BL

SUBJECT: FAA FLIGHT CHECK OF LA PAZ INTERNATIONAL  
AIRPORT NAVAIDS

REF: LA PAZ 416

1. FAA FLIGHT CHECK 727 ARRIVED IN VIRU VIRU AIRPORT,  
SANTA CRUZ ON JANUARY 21 AT 1500. FLIGHT CHECKS OF  
LA PAZ INTERNATIONAL AIRPORT AND VIRU VIRU INTER-  
NATIONAL NAVAIDS WERE CONDUCTED ON THE MORNING OF  
JANUARY 22.

2. FLIGHT CHECK TEAM PERMITTED BOLIVIAN AUTHORITIES  
AND EMBASSY OFFICER ON BOARD AIRCRAFT DURING FLIGHT  
CHECK OPERATION. THE FAA TEAM PROVIDED GOVERNMENT  
OF BOLIVIA OFFICIALS A THOROUGH BRIEFING OF RESULTS  
OF FLIGHT CHECK AND A WRITTEN COPY OF THE REPORT.  
ACCORDING TO FAA TEAM LEADER WILLIAM ARDIES, BOTH  
AIRPORTS' NAVAIDS WERE FOUND IN SATISFACTORY CON-  
DITION.

3. EMBASSY IS FOUCHING COPIES OF THE FLIGHT CHECK  
REPORT TO DEPARTMENT AND NTSB (JOHN YOUNG). CORR

BT

00562

AT 30  
JACK  
YOUNG



U.S. Department  
of Transportation

Federal Aviation  
Administration

OFFICE OF PRIMARY INTEREST

HDQS. INFO. COPY

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UNCLASSIFIED DOT785

PAGE 01 LA PAZ 00039 021909Z  
ACTION DOTE-00

INFO LOG-00 COPY-01 ADS-00 EP-00 IO-16 ARA-20 FAA-20  
/020 W

-----370053 030025Z /66

R 021904Z JAN 86  
FM AMEMBASSY LA PAZ  
TO SECSTATE WASHDC 9711  
INFO AMEMBASSY ASUNCION  
AMEMBASSY BOGOTA  
AMEMBASSY BRASILIA  
AMEMBASSY BUENOS AIRES  
AMEMBASSY CARACAS  
AMEMBASSY LIMA  
AMEMBASSY MONTEVIDEO  
AMEMBASSY QUITO  
AMEMBASSY SANTIAGO  
USMISSION USUN NEW YORK  
DIA WASHDC  
USAFSO HOWARD AFB PN//LAI//  
USCINCSO GUARRY HEIGHTS PN//J2/INTAFF/SCJ2-PLOPS//  
24COMPW HOWARD AFB PN//DOI//

INFO D O R  
- 0-700

1301

UNCLAS LA PAZ 00039

I.O. 12356: N/A  
TAGS: LAIR, EL  
SUBJECT: INVESTIGATION OF EASTERN AIRLINES ACCIDENT

REF: 85 STATE 377266

1. CAP. WALTER BALLIVIAN, BOLIVIAN GENERAL DIRECTOR  
OF CIVIL AERONAUTICS REPORTED TO THIS EMBASSY THAT  
GOB GIVES THE AUTHORIZATION FOR THE ESTABLISHMENT  
OF THE PUBLIC FILE REQUESTED. HE ALSO INDICATED  
THAT HE IS CARRYING THE OFFICIAL AUTHORIZATION  
DIRECTLY TO THE NTSB. (DRAFTED BY ECON)

UNCLASSIFIED

AIA-1/2

AIA-100

AIA-110/120/130

AIA-200

AIA-210/220

API-1

API-18/19

APO-1

AEE-1

AGC-7

AVS-1

AWS-1

AFO-1/200/800

ACS-1/5-360

ASF-100/NTSB

AAT-1/250

ADL-1

ARP-1

REGION INFO. COPY

AEU-1

ASO-4B

AWP-4F

ASW-1/AEA-200

AAC-141/251

LA FORM  
1775-1 (8-86)

131





U.S. Department  
of Transportation

**Federal Aviation  
Administration**

OFFICE OF PRIMARY INTEREST \_\_\_\_\_

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UNCLASSIFIED

PAGE 02 LA PAZ 00039 021909Z

BERNAN SOLARIS) ROWELL

UNCLASSIFIED

NNNN

**HDQS. INFO. COPY**

AIA-1/2

AIA-100

AIA-110/120/130

AIA-200

AIA-210/220

API-1

API-18/19

APO-1

AEE-1

AGC-7

AVS-1

AWS-1

AFO-1/200/800

ACS-1/5-360

ASF-100/NTSB

AAT-1/250

ADL-1

ARP-1

**REGION INFO. COPY**

AEU-1

ASO-4B

AWP-4F

ASW-1/AEA-200

AAC-141/251

1A FORM  
1770-1 (8-85)

132

DEPARTMENT OF STATE TRANSMITTAL SLIP		CLASSIFICATION <i>Unclassified</i>
		DATE <i>1/23/85</i>
TO <i>NTSB</i>		For the Attention of <i>John D. Young</i>
FROM <i>Embassy La Paz</i>		
TO THE FOREIGN SERVICE		TO THE DEPARTMENT
<input type="checkbox"/> For Transmittal to Addressee at the Discretion of Post <input type="checkbox"/> Post Information Only <input type="checkbox"/> Transmit to Foreign Office <input type="checkbox"/> Submit Report <input type="checkbox"/> Reply to the Individual		<input type="checkbox"/> Dept. Information Only <input type="checkbox"/> CERP Publications <input type="checkbox"/> Enclosure to Previous Airgram <input type="checkbox"/> Reply to Department Request
<input type="checkbox"/> Transmit to: <input type="checkbox"/> Inform:		(U. S. Agency)
REFERENCE		
ITEMS/REMARKS  <i>FAA flight check report of La Paz International Airport</i>		
IN REPLY REFER TO FILE NUMBER AND DRAFTING OFFICE		
FILE NO.	SIGNATURE <i>[Signature]</i>	
CLASSIFICATION <i>Uncl</i>	OFFICE <i>Econ</i>	

FORM DS-4  
12-64

\* GPO : 1985 O-202-212-(67)

## F5 8071-16

(b)(7) - (D)

VCZ (ILS) GS MOD 81.5% LOC 20/20%

SUR 314°/10-70 NM +2.5° FL-240

10KHz - 25.0%

VAR - 31.0

REF - 32.0

PAZ VOR 134°/110NM - 15/+3.5° FL-240 5WV

134°/0-25NM/+3.7° FL-140/240 25WV+

108°/0-25/+3.9° FL-240 25WV+

108°/35-52/+2.2° FL-240 5WV

10KHz - 29.0 VARIOUS MILEAGES

VAR - 29.0

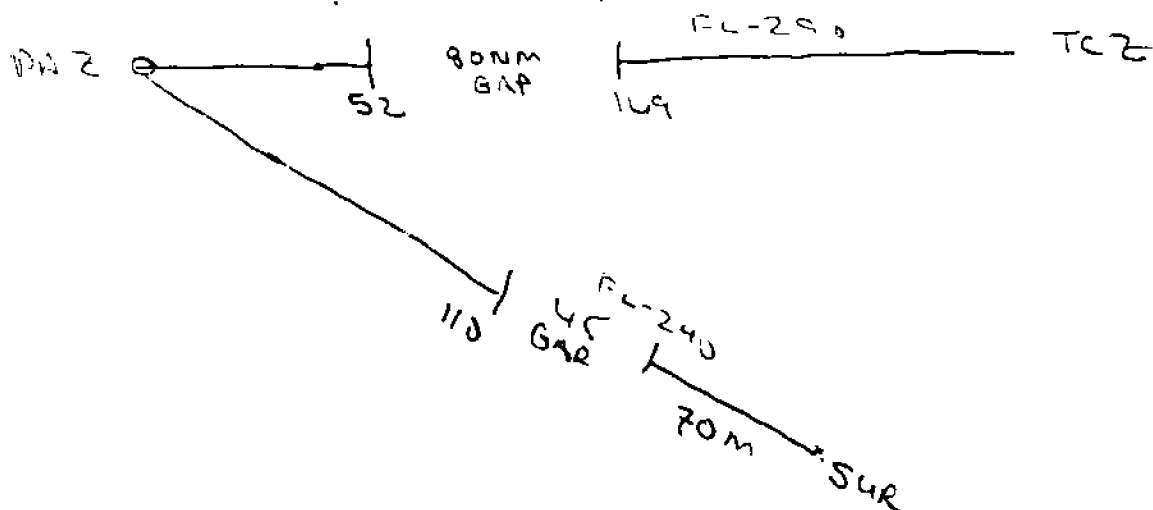
REF - 24.0/31.0

TCZ 238°/169 NM - 5WV FL-290

10KHz - 40.0

VAR - 25.0

REF - 31.6



VIR 10KHz - 43.0

VAR - 33.0

REF - 29.7

ILP-ILS GS 80.0 LOC - 20%

La Paz, 2 January 1985

Mr Eduardo Reyes I.  
Chief, ACC SLLP

Dear Sir:

I submit to you the following information regarding Flight EA-980: at 0027 hours, EA-980 calls on TMA frequency, 123.9, the call is answered and he is told to continue. EA-980 indicates he is at Flight Level 350 and estimates DAKON position at 0047; I authorize the flight to proceed to the La Paz VOR, advise him that no delays are expected, and inform him of the exact time in La Paz at the moment. EA-980 requests descent and he is cleared to FL 250, the aircraft advises that it is departing FL 350, his position is verified, and he is asked to report DAKON, the aircraft acknowledges instructions received. (I must note that the minimum enroute altitude on route UA320 is FL 230 and that this aircraft gave position reports at ESELA, CAMIRA, SUCRE, and estimated DAKON at 0037 on frequency 123.7 with SANTA CRUZ).

At 0037, EA-980 calls passing DAKON; my colleague, Luis Osorio, acknowledges receipt of the position report and asks for EA-980's present flight level, EA-980 reports that it is at FL 250 to which he is given permission to continue descent to 18,000 ft and to report departing FL 250. To this, EA-980 reports leaving FL 250, his position is verified and he is asked to report 20 miles out for hand-off to tower, which does not occur and all form of contact, on all available frequencies, is lost and the aircraft is declared in the ALERFA (alert) phase.

I would like to point out that EA-980 reported DAKON and that the minimum hard altitude in that sector between the 120° and 330° radials is 18,000 ft, and that between DAKON and the La Paz VOR, descent is authorized to 18,000 ft according to our charts.

In this situation we tried to get assistance from the adjacent control centers, and especially from Antofagasta, Lima, and Santiago de Chile, which is difficult because of the poor quality of our (HF) frequencies 10024, 10096, 6649, 8855, that are very noisy, as are the ISB frequencies, especially with Antofagasta which was impossible, keeping in mind that Arica was the alternate for EA-980.

At 0228 hours, DETRESFA (distress) phase was declared, during which we went to the adjacent control centers for any information on EA-980 which also turned up negative. To confirm what I have presented herein, I recommend you check with the tape recording of the events that includes everything in this letter.

Attentively,

Fernando Azuga H.  
ATC Controller

Airport, 2 Jan 85

Mr Eduardo Reyes  
Chief, ACC SLLP (La Paz)

Dear Sir:

I submit the following information to you relating to Eastern Flight 980 SGAS/SLLP. According to the position report passed by the TMA, this flight estimated the VOR at 0047 hours, at 18,000 ft altitude. Normally, this aircraft should have called La Paz Tower on 118.3 at the estimated time, but it did not do so, so I called the ACC at 0051 hours, requesting information; I was told that the aircraft had already been passed to tower frequency. From that moment, no further contact was made with the aircraft on any frequency; many calls were made on 118.3 and 123.9 without any results, similarly, the Eastern employees had been trying to contact the aircraft.

Subsequently, and after having called the stations at Lima, Antofagasta, Arica, and Santa Cruz, without any positive results, the alert phase and distress phase messages were transmitted. It must be reemphasized that there was never any contact with EA 980 on the tower frequency, 118.3.

This is all I have to report for your disposition.

Attentively,

Carlos Patón Loza  
Tower Controller SLLP (La Paz)

NPB - 05 JAN - 1985

Ref: FLt 980/01 JAN 1985 =

At 20<sup>40</sup> local time aircraft did call in

Range on our VHF 130.7 Freq. at that time I did gave them the weather 0000Z

(Ckk / CE W/L 63 RA 4/51/500 4/20/2100 7/01 1035)

and adv. that max/min fuel will be

23000 LBS out of LBB. aircraft did ack.

the msg and told the ETA LBB at

20<sup>55</sup>, then our monitor radio we did

heard that LBB<sup>tower</sup> was calling a/c several times adv them to get in touch on

118.3, with out any respond, minutes

later I<sup>tower</sup> gave a/c 3 other Freqs and

same luck we respond from a/c.

after LBB tower did call us to find out

if we did get in touch with a/c, I

told them "yes" we did, they ask if

possible then our VHF 130.7 adv them

that tower was calling on 118.3 Freq

at that time we did not get any

respond either, then I did call ATC by

phone NBR 347 asking them if they

did get in touch with a/c, ATC adv

that at 20<sup>37</sup> local time the a/c did

report DAKON AT LEVEL 25000 FEET and

after that they did not had any other

info on EA a/c. At 2100 local time we

did start to worried and went out 138

to hear if a/c was overhead, lights on  
any were on,

We did call several times to ATC and tower  
if they had any info on a/c they adv.  
situation remain the same.

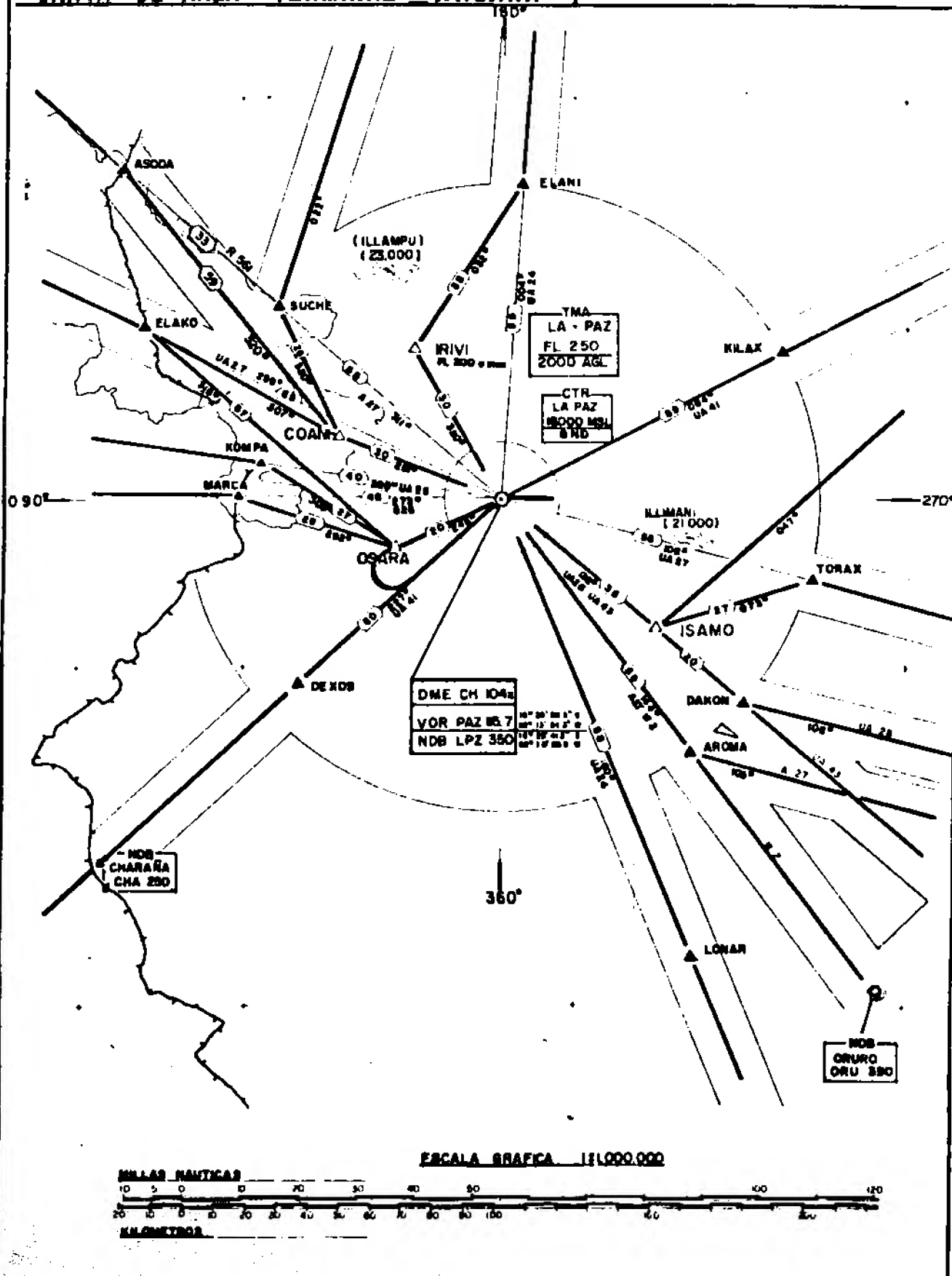
At 2:15 PM we thought that by any reason  
FLT 980 did continued to his Lt. ALICA.

~~Franklin~~  
OPS AGENT WPB





T M A      L A P A Z



AIP BOLIVIA

CARTA DE APROXIMACION  
POR INSTRUMENTOS OACI

VOR-J

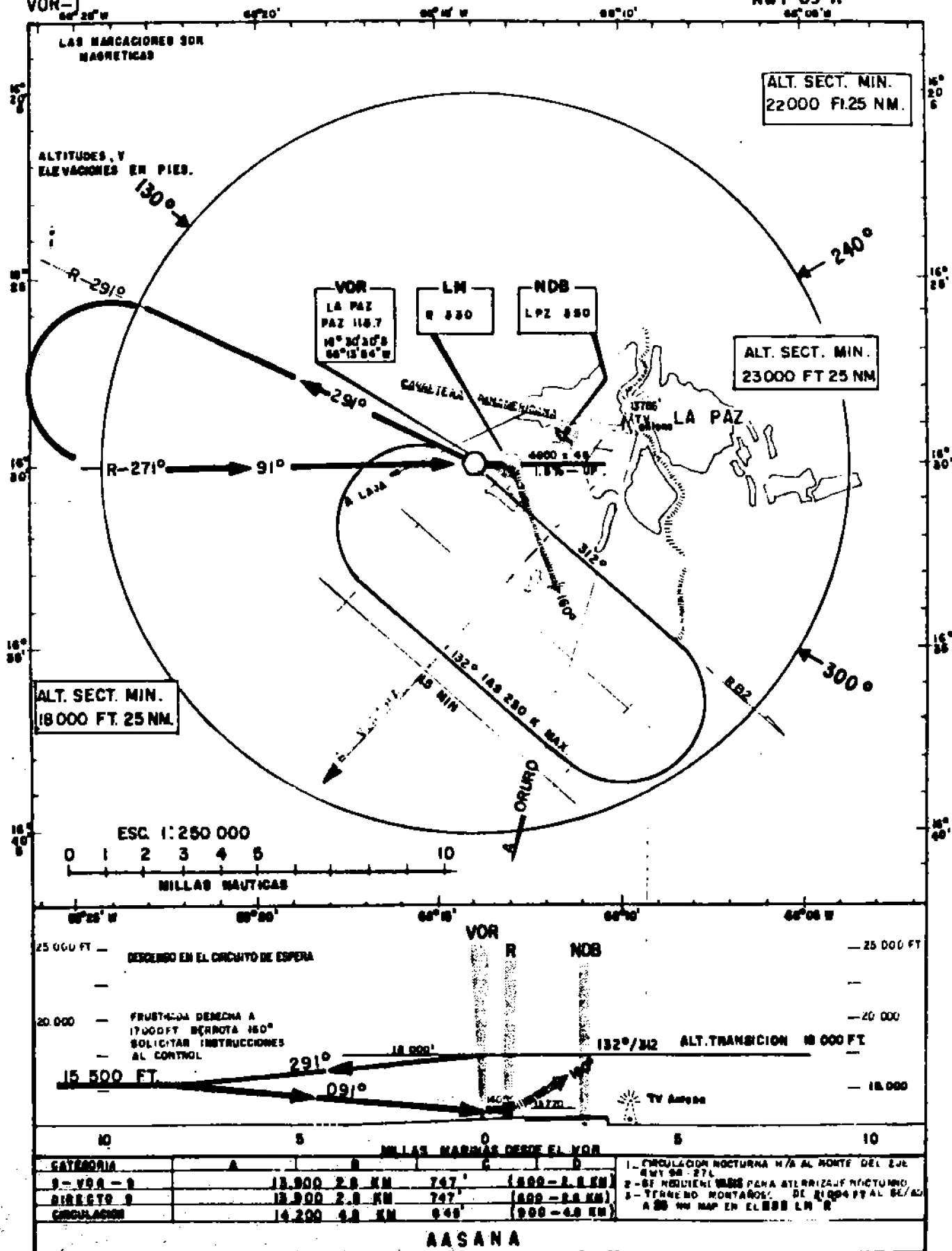
ELEV.  
THR 09 13106 FT

APP 119.5  
TWR 118.3

J.F. KENNEDY INTL. (SLLP)

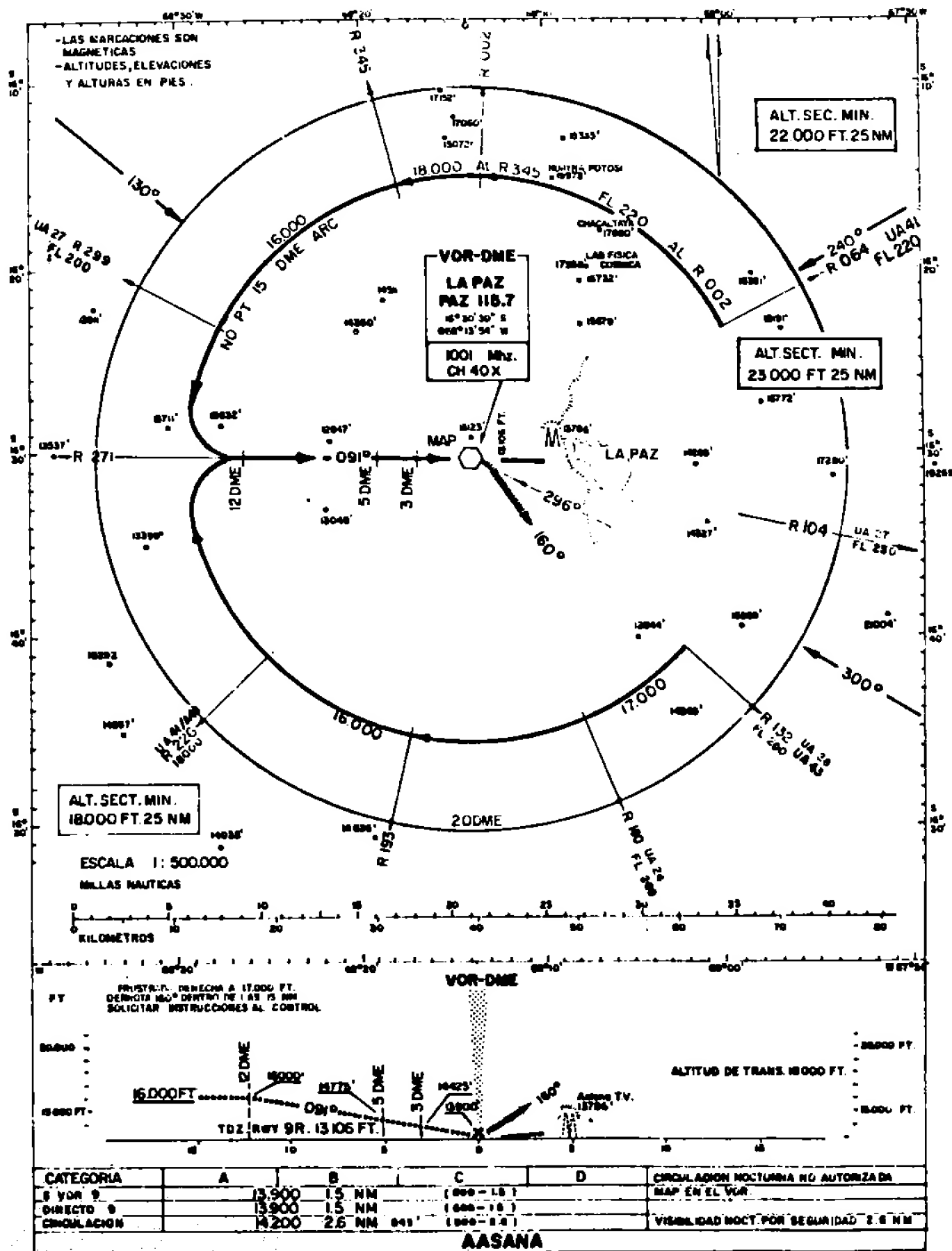
LA PAZ BOLIVIA

RWY 09 R



142 LP. 26-NOV-81  
AMD - 014

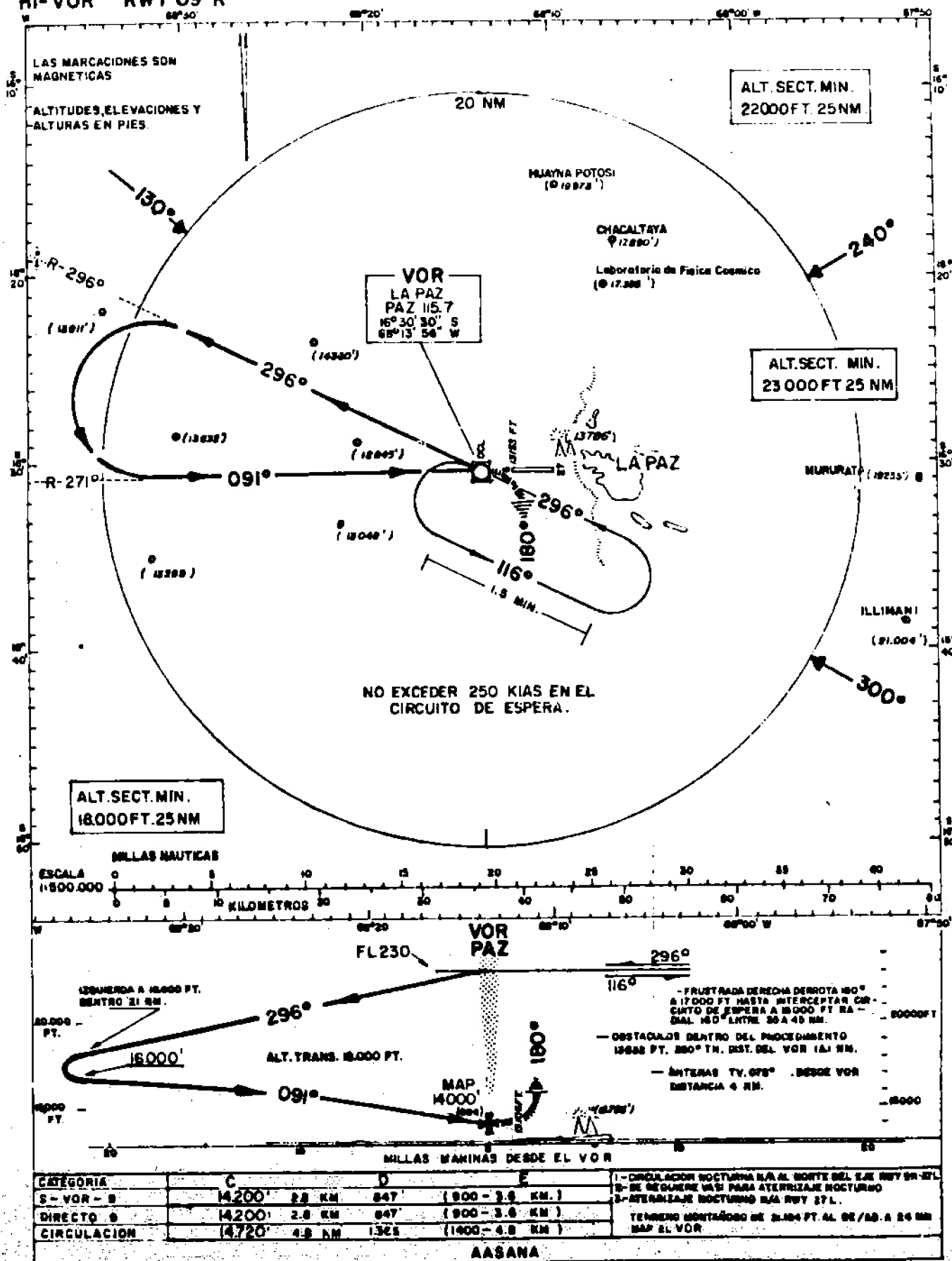
LA PAZ BOLIVIA RWY 09-R  
ELEV. APT. 13510 FT. 330 R



143 LP. 26-NOV-81  
AND - 014

J.F.KENNEDY INTL.(SLLP)  
LAPAZ-BOLIVIA VOR RWY 09 F  
ELEVAPT.13,310 F.T.

HI-VOR RWY 09 R



LP. 26-NOV-81  
AMD - 014

AIP BOLIVIA

RAC 4-2.9

J.F. KENNEDY INTL.  
LA PAZ BOLIVIA  
RWY 09 RCARTA DE SALIDA  
POR INSTRUMENTOS

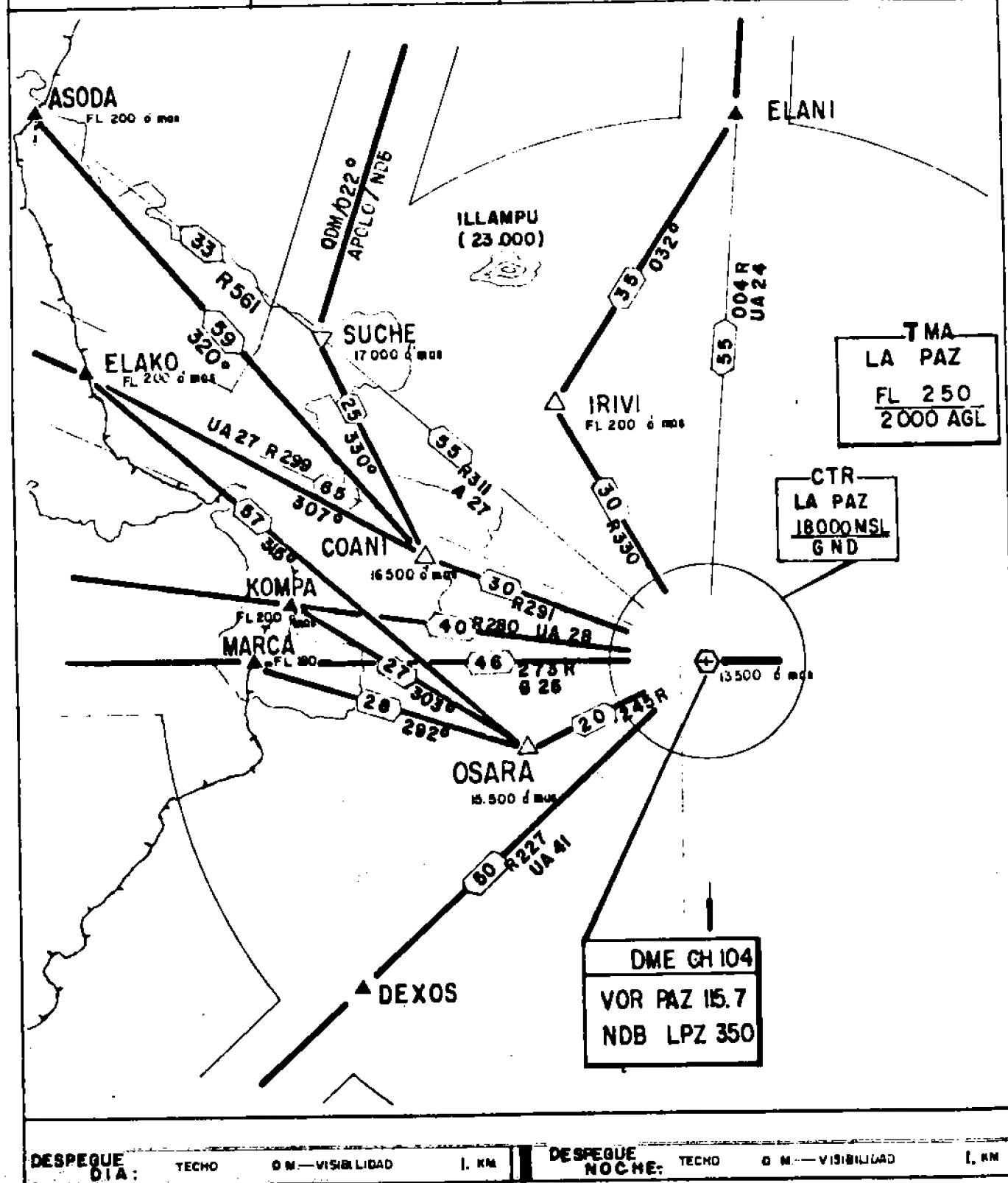
COANI UNQ

IRIVI UNQ

OSARA UNQ

DEXOS UNQ

TORRE	CONTROL	CENTRO	
118.3 MHz	APROXIMACION 119.5 MHz	123.9 MHz 128.2 MHz	

DESPEQUE  
DIA:

TECHO

OM—VISIBILIDAD

I. KM

DESPEQUE  
NOCHE:

TECHO

OM—VISIBILIDAD

I. KM

LP. 26-NOV-81  
AMD - 014

145

**CARTA DE SALIDA  
POR INSTRUMENTOS**

ISAMO UNO

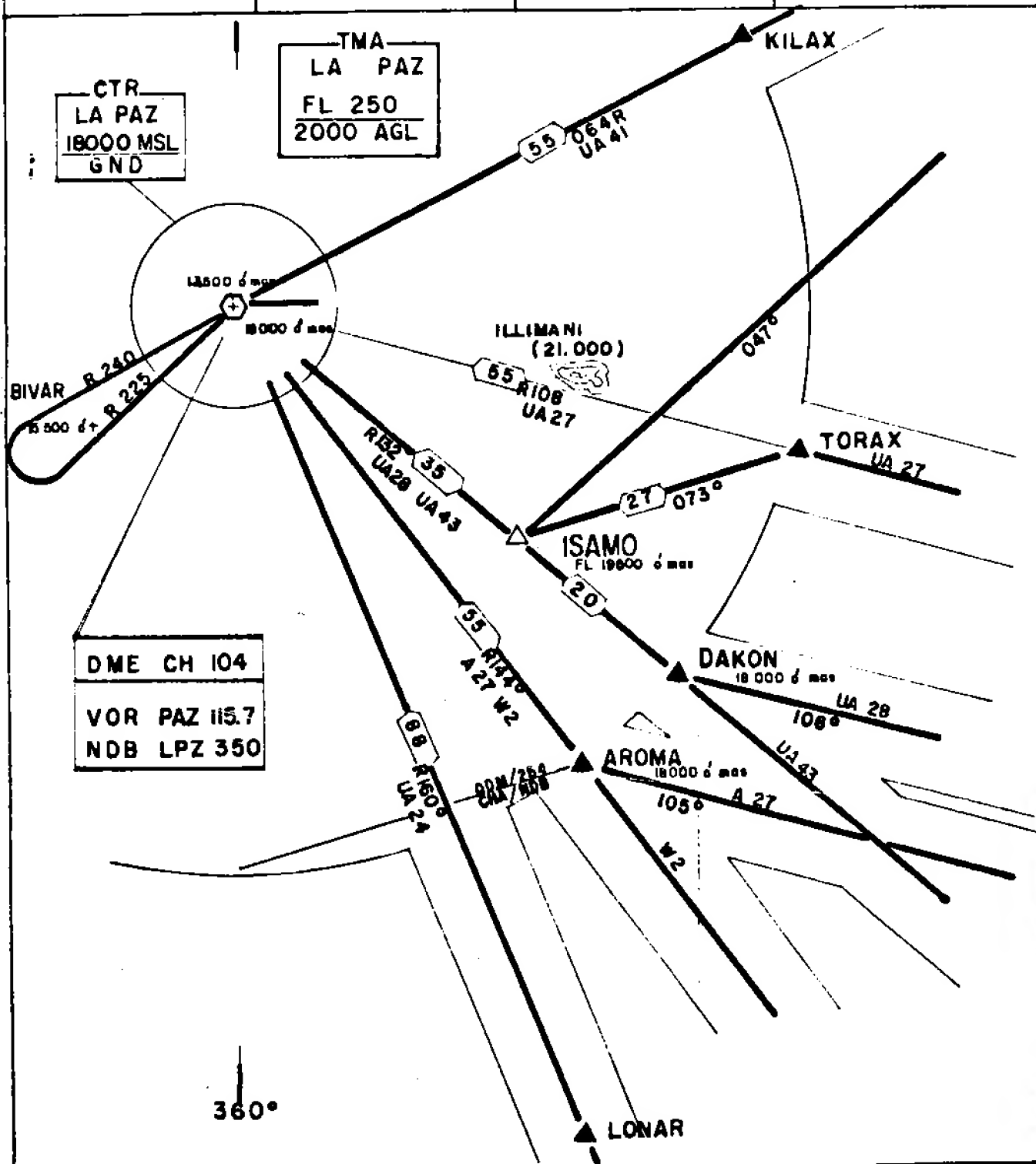
SIVAR UNO

**AROMA UNO**

DAKON UNO

LONAR UNO

TORRE		CONTROL		CENTRO	
118.3 MHz		APROXIMACION		123.9 MHz	
		119.5 MHz		129.2 MHz	



**DESPEQUE**  
**DIA:**

**TECHNO**

### 0 M—VISIBILIDAD

1 km.

**DESPEQUE  
NOCHE:**

TECHNOLOGY

**0 M--VISIBILIDAD**

L KM.

LP. 26-NOV-01  
AMD - 014

146

PROCEDIMIENTO DE APROXIMACION "ILS"AEROPUERTO INTERNACIONAL JOHN F. KENNEDY - LA PAZ1. PROCEDIMIENTO DE ESPERA

- 1.1 Radial 132  
1.2 Derrota de acercamiento 312°  
1.3 Altitud mínima en la espera, 18.000 pies QNH (Altitud de Transición)  
1.4 Todos los virajes a la izquierda

2. PROCEDIMIENTO DE APROXIMACION (IAL)

- 2.1 Aproximación Intermedia: Alejamiento 294°; descendiendo a 15.000 pies. Viraje a la izquierda para interceptar el curso del localizador del ILS a 15.500 pies. Seguir el curso del localizador 091° descendiendo de 15.500 a 15.000, interceptar la senda de planeo (GP) en el punto de referencia de aproximación final (FAF) ubicado a 7.08 NM del DME/ILS.  
2.2 Aproximación Final: Iniciar descenso en el FAF siguiendo el GP de 2,5° hasta completar el aterrizaje con pista a la vista, o si al alcanzar la altitud de decisión de 15.360 pies como mínimo, no se tiene pista a la vista, iniciase el procedimiento de aproximación frustrada.

3. APROXIMACION FRUSTRADA

- 3.1 Subir en el R091 hasta alcanzar el punto de viraje (TP) a 2NM del DME/ILS cruzándolo a 13.680 pies o superior. Iniciar viraje a la derecha, derrota 180° para interceptar y seguir el R160, cruzar punto 25NM DME/VOR a 17.000 pies, continuar hacia el punto de espera "ATIPO" subiendo a 18.000 pies o solicitar instrucciones al control para regresar al VOR.

- 3.2 PUNTO "ATIPO"      R160      35NM  
                         QDM      135°      ORU/NDB  
                         QDM      249°      CHA/NDB

4. ESPERA EN APROXIMACION FRUSTRADA

- 4.1 En el punto "ATIPO" se establece un circuito de espera entre 35NM y 45NM del VOR/DME. Radial 160; derrota de acercamiento 340°, altitud 18.000 pies, todos los virajes a la izquierda.

5. ALTITUDES MINIMAS DE SECTOR

Entre R330 y R060 ALT. 22.000 Ft.  
Entre R060 y R120 ALT. 23.000 Ft.  
Entre R120 y R330 ALT. 18.000 Ft.

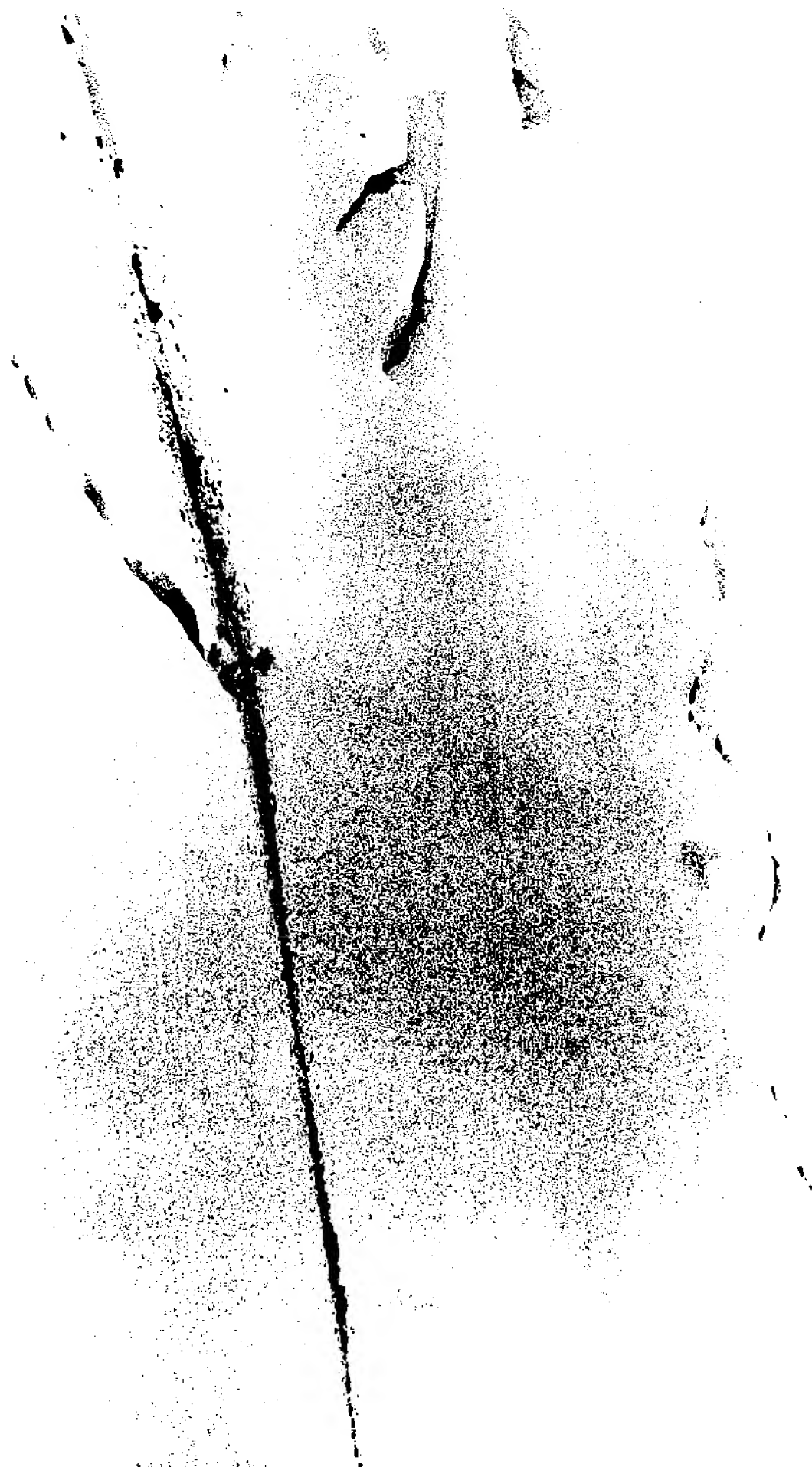










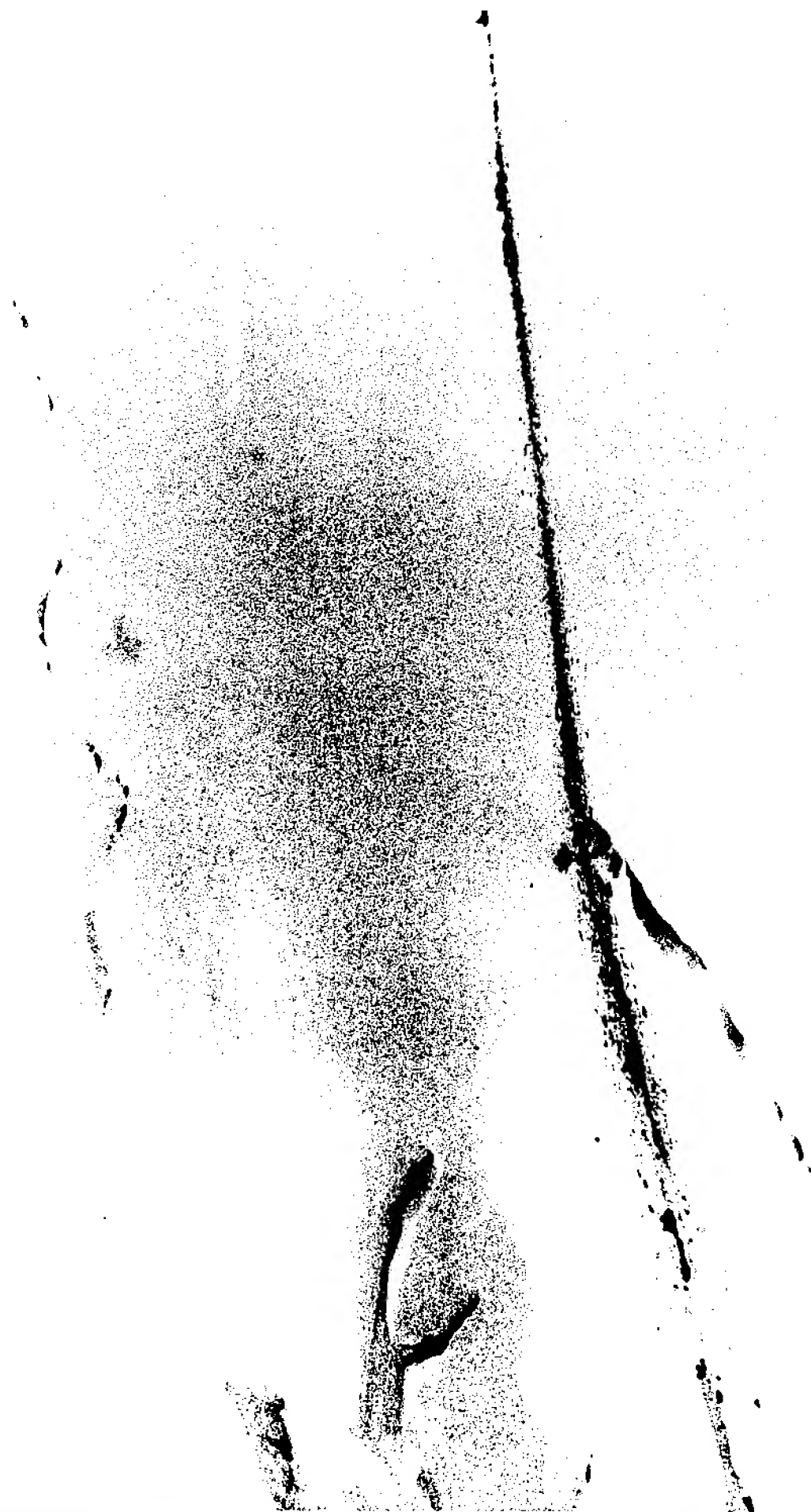
























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Additions to Docket

DCA85RA007  
LaPaz, Bolivia  
January 1, 1985

Air Traffic Control Group Chairman's Factual Report	61
Memo – Mount Illimani Expedition	10
Republic of Bolivia, Ministry of Aeronautics Final Report (English and Spanish)	33

NATIONAL TRANSPORTATION SAFETY BOARD  
Bureau of Technology  
Washington, DC 20594

December 20, 1986

ATC GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION  
DCA 85-R-A007

A. ACCIDENT

Location : Illimani Mountain, about 26 nautical miles (NM)  
east southeast of Lapaz, Bolivia

Date : January 1, 1985

Time : 0045 UTC 1/

Aircraft : Eastern Airlines Inc. Flight 980 (EA980),  
Boeing 727-225, N819EA

B. ATC GROUP

William M. O'Rourke  
NTSB, TE-30  
Washington, DC 20594

Captain Billy Stephens  
VP, Flying Operations/Safety  
Eastern Airlines, Inc.  
Miami, FL 33102

Captain Don McClure  
ALPA  
Herndon, VA 22070

Rodolfo M. Beltran  
Chief, Operations Department  
El Alto International Airport  
LaPaz, Bolivia

T/SGT MAJ Fernando A. Lopez, BAF  
Accident Investigation Section  
Bolivian Air Force  
El Alto International Airport  
LaPaz, Bolivia

1/ All times shown herein are Coordinated Universal Time (UTC)  
and are based on the 24-hour clock.

SGT Ramiro I. Encinas, BAF  
Chief, ATC Section  
Bolivian Air Force  
P.O. Box 1008  
LaPaz, Bolivia

### C. SUMMARY

On January 2, 1985, at about 0045, Eastern Airlines Flight 980 (EA980), a Boeing B727-225, collided with mountainous terrain approximately 21,000 feet above mean sea level (MSL) about 26 NM east southeast of LaPaz, Bolivia. The aircraft was destroyed. The 8 crew members, 2 dead-heading company employees, and 19 passengers received fatal injuries.

The flight was operating as a regularly scheduled passenger flight from Asuncion, Paraguay, to Miami, Florida, with passenger stops scheduled at LaPaz, Bolivia and Guayaquil, Ecuador. Additionally, a stop for refueling purposes only was planned at Arica, Chile, after departure from LaPaz.

At the time of the accident, EA980 was operating on an instrument flight rules (IFR) flight plan and was under the control of, and in communications with, the LaPaz Area Control Center (ACC) 2/.

### D. DETAILS OF INVESTIGATION

#### 1. History of Flight

The flight received its air traffic control (ATC) clearance from the Presidente Stroessner International Airport Traffic Control Tower (ATCT) at about 2245. The clearance was to the LaPaz Airport via airway UA320 at an assigned altitude of flight level (FL) 350.

The flight departed Asuncion at 2254 and contacted the Asuncion ACC at about 2259.

At 2330, the flight reported to the Asuncion ACC that it over the Filadelfia, Paraguay (SGFI), Non-Directional Beacon (NDB) at FL350.

At 2346, EA980 contacted the Santa Cruz ACC and advised that it was approaching the ESELA intersection. At 2350, the flight reported over the ESELA intersection at FL350 and was estimating the Camiri, Bolivia (SLCA) NOB at 0002.

2/ Area Control Center (ACC) - ATC facility providing en route services to IFR aircraft. Similar to FAA ARTCC.

At 0001, EA980 reported to Santa Cruz ACC that the flight had passed ESELA on the hour (2400/0000) at FL350 and was estimating the Sucre, Bolivia (SSRE) VOR at 0015.

At 0015, EA980 reported to the Santa Cruz ACC that the flight was over the Sucre VOR at FL350 and was estimating the DAKON intersection at 0037. The Santa Cruz ACC controller acknowledged the position report and instructed the flight to contact the LaPaz ACC on 123.9 mhz at the DAKON intersection.

At 0025, EA980 contacted the LaPaz ACC and advised that the flight was estimating DAKON at 0037, maintaining FL350 and requested a lower altitude. The LaPaz ACC controller cleared the flight direct to the LaPaz VOR and to descend and maintain FL250. The controller also advised EA980 that no delays were expected. Additionally, the LaPaz ACC controller issued the current LaPaz weather to EA980. At 0026, EA980 advised the LaPaz ACC that the flight was leaving FL350 for FL250.

At 0037, EA980 advised the LaPaz ACC that the flight was over DAKON. The LaPaz ACC controller asked the flight what altitude it was leaving. The flight replied it was maintaining FL250. The LaPaz ACC controller then instructed EA980 to descend and maintain 18,000 feet. The flight acknowledged descent instruction.

At 0038, the LaPaz ACC controller instructed EA980 to report when it was 20 miles from the LaPaz VOR/DME. The flight's acknowledgement of this instruction was the last communication received/recorded from EA980.

## 2. LaPaz Airport

The LaPaz International Airport is located at 16° 30' 30" South Latitude/ 068° 13' 54" West Longitude, about 5 NM west of the city of LaPaz at an elevation of 13,330 feet MSL. The elevation of the approach end of runway 9R is 13,106 feet MSL.

## 3. Air Traffic Control Facilities

ATC services and facilities, within the country of Bolivia, are operated by a government agency, Administracion de Aeropuertos y Servicios Auxiliares a la Navegacion Aerea (AASANA). This organization is charged with the responsibility with providing ATC services and maintaining electronic aids to navigation (NAVAIDS) with the airspace defined as the LaPaz Flight Information Region (FIR).

(a). LaPaz ACC

The LaPaz ACC, operated 24 hours per days, provides en route separation of aircraft through the use of non-radar procedures for an area encompassing approximately a 60 nautical mile radius of the LaPaz Airport from the surface to FL430 and excludes the airspace defined as the TCA and CZ. The ACC facility has no radar and utilizes both very high and ultra high frequency radio equipment to communicate with aircraft under its control. High frequency radio equipment is utilized for point-to-point voice communications between the ACC and adjacent ATC facilities.

(b). LaPaz Terminal Control Area (TCA)

The LaPaz TCA, is a non-radar terminal approach control facility. The TCA operates 24 hours a day and provides separation to aircraft operating on IFR flight plans/clearances. Its area of responsibility encompasses a 20 nautical radius of the LaPaz Airport from the surface to 18,000 feet MSL and excludes that area defined at the LaPaz Airport Control Zone (CZ).

(c). LaPaz Airport Traffic Control Tower (ATCT)

The LaPaz ATCT is a VFR control tower facility. The ATCT operates 24 hours a day and its area or responsibility is defined as the airport control zone.

4. Aids to Navigation (NAVAIDS) & Voice Communications

Investigators visited the below listed Bolivian Government NAVAID facilities and documented following information:

(a). Instrument Landing System/Distance Measuring Equipment (ILS/DME) Runway 9.

COMPONENT	:	Localizer	Glide Slope	DME
FREQUENCY	:	110.3mhz	335.0	Ch. 40X
MANUFACTURER:		Phillips	Phillips	Phillips
MODEL	:	#7404	#7404	#7404
CHANNELS	:	2	2	2
BACKUP POWER:		Yes	Yes	Yes
INSTALLED	:	11/83	11/83	11/83

4

COMMISSIONED:	12/08/83	12/08/83	12/08/83
INITIAL FLT CHECK :	12/08/83	12/08/83	12/08/83
SUBSEQUENT FLT CHECK :	None	None	None
MOST RECENT FLT CHECK :	12/08/83	12/08/83	12/08/83
DAILY MAINT.: ROUTINES 3/	<-----IAW MANUALS ON HAND----->		

3/ Maintenance technicians stated that daily checks are made on all components of the ILS system in accordance (IAW) with the recommended manufacturers technical manuals on hand. Additionally, maintenance personnel perform a 15-day comparison on the daily readings in a search for trends of falling system performance.

(b). Very High Frequency Omni-Directional Range/  
Distance Measuring Equipment (VOR/DME)

COMPONENT	VOR	DME
FREQUENCY	115.7 mhz.	Ch. 104
MANUFACTURER	Philips	Wilcox
MODEL	7503	596B
CHANNELS	2	2
BACKUP POWER	Yes	Yes
INSTALLED	10/07/82	10/07/82
INITIAL FLT CHECK	10/07/82	10/07/82
SUBSEQUENT FLT CHECK	None	None
MOST RECENT FLT CHECK	10/07/82	10/07/82



DAILY MAINT.  
ROUTINES

<---IAW MANUALS ON HAND---

(c). Non-Directional Beacon (NDB)

COMPONENT	NDB
FREQUENCY	350
MANUFACTURER	Federal Telephone & Radio Corp.
MODEL	166A
CHANNELS	1 <u>4</u> /
BACKUP POWER	Yes
INSTALLED	Unknown <u>5</u> /
COMMISSIONED	Unknown
INITIAL FLT CHECK	Unknown
SUBSEQUENT FLT CHECK	Unknown
MOST RECENT FLT CHECK	Unknown
DAILY MAINT. ROUTINES	IAW MANUALS ON HAND

4/ NDB equipment installed originally had two (2) channels. Over the years, and due to the age of the equipment, the second channel was removed from service and its parts were utilized to keep the remaining channel operational.

5/ Present NDB was installed about 1945 by Pan American Grace Airways (PANAGRA). Over the years, both PANAGRA and Lloyd Aero Boliviano (LAB) were responsible for maintenance on the facility. In 1968, AASANA assumed responsibility for maintenance on the facility. Maintenance personnel had no knowledge or record of past flight inspection history on the facility.

(d). Very High Frequency (VHF) Radio Equipment 6/

COMPONENT	TX	TX	TX	REC	REC	REC
FREQUENCY	118.3	119.5	123.9	118.3	119.5	123.9
MANUFACTURER	<-----COLLINS----->			<-ERCO RADIO LABS->		
MODEL	TV36	TV36	TV36	RV12	RV12	RV12
POWER OUTPUT	50W	50W	50W	N/A	N/A	N/A
BACKUP POWER	Yes	Yes	Yes	Yes	Yes	Yes
INSTALLED	<TX & REC EQUIPMENT INSTALLED IN 1973>					
COMMISSIONED	<----TX & REC COMMISSIONED IN 1973----					
INITIAL FLT CHECK	<----NO RECORD OF FLIGHT CHECKS----->					
SUBSEQUENT FLT CHECK	<----NO RECORD OF FLIGHT CHECKS----->					
MOST RECENT FLT CHECK	<----NO RECORD OF FLIGHT CHECKS----->					
DAILY MAINT.	<-----IAW MANUALS ON HAND----->					

6/ VHF radio equipment and associated maintenance manuals were provided to the Bolivian Government by the FAA.

(e). High Frequency Communications Radios (HF)

HF radio equipment utilized for point-to-point ground communications between ATC facilities was installed prior to 1973. The equipment was manufactured by Scientific Radio Systems.

5. OMEGA Navigation System

EA980 was equipped with an onboard OMEGA navigation receiver/processor utilized for enroute navigation.

OMEGA is a network of eight transmitting stations operated by the U.S. Coast Guard (USCG) located throughout the world to provide worldwide signal coverage. These stations transmit in the very Low frequency (VLF) frequency band. Because

of the low frequency, the signals are receivable to ranges of thousands of miles. The stations are located in Norway, Liberia, Hawaii, North Dakota (USA), La Reunion, Argentina, Australia, and Japan.

The FAA recognizes OMEGA navigational systems as an additional means of en route IFR navigation within the conterminous United States and Alaska when approved in accordance with FAA guidance information. The use of OMEGA requires that all navigation equipment otherwise required by Federal Air Regulations (FAR) be installed and operational. Aircraft utilizing OMEGA or RNAV routes must have operational VOR and DME equipment.

Each Station transmits on four basic navigational frequencies: 10.2 khz, 11.05 khz, 11.3 khz, and 13.6 khz, in a time sequenced format. This sequenced format prevents interstation signal interference. With the eight stations and a silent .2 second interval between each transmission, the entire transmission cycle repeats every 10 seconds.

In addition to the four basic navigational frequencies listed above, each station transmits a unique navigational frequency. An OMEGA station is said to be operating in full format when the station transmits on basic frequencies plus its unique frequency. The unique frequencies are:

STATION	LOCATION	FREQUENCY
"A"	Norway	12.1 khz
"B"	Liberia	12.0 khz
"C"	Hawaii	11.8 khz
"D"	North Dakota	13.1 khz
"E"	La Reunion	12.3 khz
"F"	Argentina	12.3 khz
"G"	Australia	13.0 khz
"H"	Japan	12.8 khz

The OMEGA navigation network is capable of providing consistent fixing information to an accuracy of plus or minus 2 nautical miles depending upon the level of sophistication of the receiver/processing system in use aboard the aircraft.

OMEGA signals are affected by propagation variables which may degrade fix accuracy. These variables include daily variation of phase velocity, polar cap absorption, and sudden solar activity. Daily compensation for variation within the receiver/processor, or occasional excessive solar activity and its effects on OMEGA cannot be accurately forecast or anticipated. If an unusual amount of solar activity disturbs the OMEGA signal enlargement paths to any extent, the USGC Omega

Navigational System Operations Detail Office (G-ONSOD) will advise the FAA and an appropriate NOTAM will be issued. NOTAMS concerning OMEGA status are available through any FAA Flight Service Station (FSS) and are listed under the OMEGA station /location name.

The U.S. National Bureau of Standards (NBS) radio station WWV (Ft. Collins, Colorado) broadcasts a message concerning the status of each OMEGA station, signal irregularities, and other information at 16 minutes past each hour. Additionally, NBS radio station WWVH, located in Hawaii, broadcasts similar information at 47 minutes past each hour.

Safety Board investigators contacted the OMEGA Detail at USCG Headquarters, Washington, DC, and requested the status of the worldwide OMEGA system at the time of the accident. Personnel assigned to the OMEGA Detail stated that all eight OMEGA transmitting stations were on the air and transmitting at normal power during the time period between EA980's departure from Asuncion, Paraguay, and the estimated time of the accident.

Additionally, USCG personnel advised Safety Board investigators that there were no abnormalities with the OMEGA system due to propagation or solar activity during the same time period.

#### 6. NAVAID Flight Inspection

The most recent flight inspection performed on the LaPaz VOR/DME was completed by an Argentinian Air Force aircraft when the facility was commissioned on October 7, 1982. Based on the length of time between the commissioning flight inspection and the date of the accident, Safety Board investigators requested through the assigned FAA Coordinator that the FAA complete a flight inspection of that facility as well as other LaPaz area NAVAIDS.

On January 22, 1985, the FAA completed an airborne flight inspection of the LaPaz Airport NAVAIDS was completed by the FAA utilizing a Boeing 727 aircraft. All airport NAVAIDS were found to be in satisfactory condition.

#### 7. Air Traffic Controller: Observations and Statements

On January 3, 1986, Safety Board investigators met with personnel from AASANA and received a briefing on ATC procedures utilized by that organization and its ATC personnel in the control of IFR air traffic. AASANA personnel stated that

Bolivian ATC procedures were conducted in accordance with Annex 12 of the International Civil Aviation Organization (ICAO). Upon completion of the briefing, air traffic control personnel on duty in the ACC and ATCT when the accident occurred were made available for an interview with the ATC Group.

During the interview conducted with the LaPaz ACC Senior Controller, he stated that EA980 called initially on frequency 123.9 mhz and gave the flight's estimate at DAKON as 0037 and reported level at FL350. He stated that he advised EA980 of the current LaPaz weather and cleared the flight direct to the VOR.

The ACC controller stated that EA980 requested a lower altitude and that he instructed the flight to descend to FL250. Additionally, he stated that the lowest assignable altitude that he could have issued the flight was FL230 prior to the flight reporting over the DAKON intersection.

The ACC controller stated that when EA980 reported passing DAKON at 0037, that the call was heard over a speaker in the control room and since he was slightly away from the microphone position, his colleague acknowledged the report and instructed EA980 to descend to 18,000 feet and report 20 DME from the LaPaz VOR. The ACC controller stated that the airplane acknowledged the descent instruction to 18,000 feet but never called at 20 miles as it was instructed.

The ACC controller stated that he became concerned when the flight did not call when he expected it to and that he called EA980 many times and received no answer. He stated that when he received no answer to his calls, he contacted the tower and requested that they attempt to call the flight.

The ACC controller stated that when the tower controller informed him that he had no radio contact with the flight, he then began calling other control centers to see if they were speaking to EA980. He stated that he was unable to locate any center that was talking with the flight and at about 0115, he declared the airplane down and initiated downed aircraft and search and rescue procedures.

During an interview conducted with the ATCT controller, he stated that EA980 never called the tower at any time and that when the tower called (transmitted) in the blind for EA980 that they received no reply. The ATCT controller stated that he assisted ACC personnel by contacting several associated (adjacent) ATC facilities to check if they had radio communications with the aircraft.

In addition to interviews conducted with ATC personnel, Safety Board investigators were provided with written statements from ATC personnel. On February 15, 1985, Safety

Board investigators received copies of two (2) statements, in Spanish, from Bolivian ATC personnel regarding their actions on the evening of the accident. Safety Board investigators contacted personnel at the Defense Intelligence Agency (DIA) for assistance in translating the statements as accurately as possible with consideration being given that the original statements contained data/statements of a technical nature.

#### 8. Airway/Route Structure and Procedures

Airway UA320 between the LaPaz VOR and DAKON intersection, the LaPaz 134 degree radial, is published as ten (10) nautical miles wide (5 NM either side of centerline). The published minimum en route altitude for this route segment is FL220 for aircraft over flying the LaPaz VOR.

The minimum (lowest) assignable altitude between the VOR and DAKON for aircraft inbound from DAKON to the VOR with an intended landing at LaPaz is 18,000 feet.


LaPaz ACC procedures state that the minimum hard altitude between the LaPaz 120 degree radial and 330 degree radial is 18,000 feet.

The published minimum sector altitude indicated on the LaPaz (Bolivian) Instrument Landing System runway 9R (ILS RWY 9R) Instrument Approach Procedure (IAP) between the LaPaz 120 degree radial and the 330 degree radial is 18,000 feet.

The published initial approach fix (IAF) transition is 18,000 feet.

AANASA personnel stated that the altitudes mentioned above were established in accordance with ICAO procedures and that a flight check of the airways/routes was completed prior to their official use.

United States Department of Defense Publications lists the LaPaz Airport as a Radar Facility. There is no ATC radar within the country of Bolivia.

  
William M. O'Rourke  
Air Safety Investigator

Attachments: (13 = 35 pages)

ATTACHMENTS  
ATC GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION  
DCA 85 RA 007

1. Transcripts of Radio Communications	<3 pages
2. Statements of LaPaz ACC/ATCT Personnel (Spanish)	<2 pages
3. Statements of LaPaz ACC/ATCT Personnel (English)	<2 pages
4. Copy of Flight Plan-EA980 (DGAC-Paraguay)	<2 pages
5. U.S. Embassy (LaPaz) Teletype Message Reference Flight Inspection of LaPaz NAVAIDS	<1 page
6. Instrument Approach & Area Charts (Bolivian)	<8 pages
7. Minimum Sector Altitudes, Bolivian AIP	<1 page
8. Bolivian Airspace Chart	<1 Page
9. U.S. DOD High Altitude Chart (H-5)	<1 Page
10. U.S. DOD Flight Information Publication High & Low (IAP & SID)	<11 Pages
11. U.S. DOD Flight Information Publication En Route Supplement	<1 Page
12. Flight Progress Strips (AASANA-ATC003)	<1 Page
13. NTSB Form 6200.1, Attendance Record-ATC Group	<1 Page

Total = 35 Pages

ATTACHMENT # 1



TRANSCRIPCION DE LA CINTA MAGNETOFONICA DE LAS  
COMUNICACIONES ENTRE LA AERONAVE EA980 Y EL -  
CONTROL DE AREA TERMINAL

FECHA: 02/1/85

HORA : GMT

SEGUNDA PARTE.- COMUNICACION EFECTUADA EN LA FRECUENCIA DEL TMA 123.9  
MHZ.

HRS. 00:25 EA980: LA PAZ CONTROL EA980 OVER.

CONTROLADOR: EA980 LA PAZ GO AHEAD

EA980: EA980 ESTIMATING DAKON 37 MAINTAINING FL350,  
WE'D LIKE TO START DESCEND

CONTROLADOR: LA PAZ ROGER EA980 CLEARED TO LA PAZ VOR NO DELAY  
EXPECTED DESCEND AND MAINTAIN FL250. FOR INFORMATION  
LA PAZ WEATHER REPORT 080/12 UNLIMITED 350500 100750  
3052400 07/04 QNH MILLIBARS 1034 INCHES 30.53  
CUMULUNIMBUS AT SE OF THE FIELD REPORT LEAVING  
FL350 AND REPORT DAKON POSITION OVER.

EA980; HRS. 00:26: OK EA980 DEPARTING FL350 FOR 250 AT THIS TIME,  
WE CALL YOU DAKON.

CONTROLADOR: LA PAZ ROGER EA980 LEAVING 350 REPORT DAKON OVER  
EA980: EA980 WE CALL YOU.

HRS. 00:37: EA980: LA PAZ CONTROL EA980 DAKON THIS TIME

CONTROLADOR: ROGER EA980 REPORT WHAT LEVEL ARE YOU LEAVING  
EA980: WE ARE MAINTAINING FL250

CONTROLADOR: ROGER CLEARED TO DESC 18000 REPORT LEAVING 250  
EA980: OK EA980

HRS. 00:38 EA980: LA PAZ EA980 DEPARTING FL250 FOR 18000 THIS TIME  
CONTROLADOR: ROGER EA980 REPORT 20 NM OUT.

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TRANSCRIPCION DE LA CINTA MAGNETOFONICA  
DEL VUELO EA980 EN LA RUTA SGAS/SLLP

FECHAS: 01/ENE/85  
02/ENE/85

HORA: GMT

PRIMERA PARTE. - COMUNICACIONES ENTRE EA980 Y LA ESTACION DE  
APOYO DE SLCZ, EN LA RUTA UA320, FRECUENCIA  
123.7 MHZ.

HRS.2346: EA980: SANTA CRUZ RADIO EA987 IS WITH YOU FL350  
WE ARE APPROACHING ESELA

CONTROLADOR: EA980 CONFIRM YOUR ESTIMATED CAMIRI POINT

EA980: YES SIR WE WOULD PASSING ESELA 50 FL 350

CONTROLADOR: I UNDERSTAND YOUR ESTIMATED ESELA 50 FL350.  
THAT'S CORRECT.

EA980: YES SIR THAT'S CORRECT AND OUR NEXT POINT;  
WOULD BE CAMIRI 0002.

CONTROLADOR: I UNDERSTAND YOUR ESTIMATED CAMIRI POINT0002  
IS CORRECT SIR?

EA980: YES SIR THAT'S CORRECT.

CONTROLADOR: ROGER EA980 REPORT ESELA POINT ON THIS FREQUENCY.

EA980: YES SIR WILCO THANK YOU VERY MUCH

HRS.2350: EA980: EA980 IS PASSING ESELA AT 50 ESTIMATING CAMIRI  
AT 02 FL 350

CONTROLADOR: ROGER EA 980 ESELA 50 CAMIRI 02 REPORT CAMIRI  
POINT ON THIS FREQUENCY.

EA980: YES SIR WILCO EA980.

HRS. 0001 EA980: EA980 POSITION.

..2//

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- 2 -

CONTROLADOR: EA980 SANTA CRUZ GO AHEAD  
EA980: EA980 OVER CAMIRI ON THE HOUR FL350 ESTIMATING.  
SUCRE AT 15 PASSED THE HOUR DAKON NEXT  
CONTROLADOR: ROGER EA980 ESTIMATING POSITION SUCRE 15 REPORT  
SUCRE ON THIS FREQUENCY.  
EA980: EA980 WILCO  
HRS. 0005:  
CONTROLADOR: EA980 SANTA CRUZ  
EA980: EA980 GO AHEAD  
CONTROLADOR: OK EA980 THE CONTROLLERS FROM SANTA CRUZ WISHES  
YOU PASSED LUCKY AND GOOD YEAR AND TO YOUR CREW  
AND OUR COMPANY OVER  
EA980: OK THANK YOU VERY MUCH AND HAPPY NEW YEAR TO YOU SIR  
CONTROLADOR: THANK YOU ..... illegible..... AND SANTA CRUZ  
EA980: A SAY AGAIN  
CONTROLADOR: HOPE SIR EASTERN FLYING TO SANTA CRUZ SOME DAY  
EA980: WE REALLY HOPE AND WE ALSO HOPE.... illegible..  
CONTROLADOR: i l e g i b l e  
EA980: I BELIEVE IN IT SHALL WE WAIT  
HRS. 0015:  
EA980: SANTA CRUZ RADIO EA980 POSITION  
CONTROLADOR: EA980 GO AHEAD  
EA980: OK SIR EA980 OVER SUCRE AT 15 MAINTAINING FL350  
ESTIMATING DAKON 37 LA PAZ NEXT.  
CONTROLADOR: ROGER SUCRE 15 350 DAKON 37 CONTACT DAKON  
FREQUENCY 123.9 OVER  
EA980: 123.9 THANK YOU VERY MUCH AND HAPPY NEW YEAR.

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ATTACHMENT # 2

Señor:  
Eduardo Reyes I.  
Jefe ACC/SLLP  
Presente.-

Elevo a su autoridad el siguiente informe respecto al vuelo de EA-980 : A horas 0027 EA-980 llama en frecuencia del TMA 123.9, a esta llamada de le responde y se le dice que prosiga. EA-980 indica estar a nivel de vuelo 350 y estima posición dakon a las 0047; mi persona le autoriza al VOR La Paz no se prevee demora y se le da el tiempo de la hora de la Paz, EA-980 Solicita descenso y se le autoriza hasta nivel de vuelo 250, la aeronave indica que abandona FL 350 y se le colaciona y se le indica que notifique posición dakon, la aeronave indica recibido. ( me cabe señalar que el nivel mínimo en ruta CA320 es de FL230; tambien señalar que esta aeronave dio posiciones Esela, Camiri, Sucre y estimado dakon 0037 en frecuencia 123.7 con santa Cruz)

A horas 0037 llama EA-980 indicando que pasa posición dakon y le atiende Mi Colega de turno Luis Osorio indicando recibido y el nivel en el cual se encuentra, a lo que EA-980 responde manteniendo Fl 250 a lo cual se le autoriza a continuar -- descendiendo a 18000 pies y que notifique abandonando FL 250 a esto EA-980 indica que abandona nivel de vuelo fl 250 se le colaciona y se le indica que notifique 20 millas nauticas fuera para pasar a torre, lo cual no ocurre y se pierde todo tipo de contacto en todas las frecuencias que disponemos y a la aeronave se lo declara en fase de ALERFA.

Quiero señalar que EA-980 notifico posición dakon y la altitud mínima en ese sector mas concretamente entre los radiales 120 y radial 330 es de 18000 pies ademas que entre dakon y VOR/SLLP su descenso es autorizado hasta 18000 pies según nuestras cartas .

En esta situación tratamos de conseguir colaboración de los centro de control adyacentes y en especial de Antofagasta, Lima, Santiago de Chile lo cual es difícil por la mala calidad de nuestras frecuencias 10024, 10096, 6619, 3855 que son muy ruidosas en igual sentido las frecuencias 111 en especial con Antofagasta era imposible, teniendo en cuenta que la 111 estaba como alternativa del EA-980.

A horas 0228 es declarada en fase de DETRESFA, acudiendo cualquier información a los centro adyacentes respecto a EA-980 lo cual es negativo. Para confirmar lo anterior dicho solicito a su autoridad el chequeo de la grabación en la cual esta todo lo anterior explicado.

Atentamente.

FERNANDO AZUGA H.

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Aeropuerto, 02 de Enero de 1985

Señor

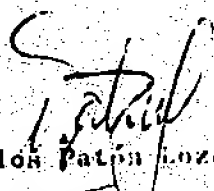
Eduardo Reyes  
JEFE ACC SLLP

Presente:

Elevo a usted el siguiente informe con relación al vuelo de EA980 SGAS/SLLP. Este vuelo de acuerdo a transferencia de la posición TMA, estimaba el VOR a horas 0047 y a 18.000 pies. Como es normal esta aeronave debía llamar a Torre La Paz en la frecuencia de 118.3 a la hora estimada, pero no lo hizo, siendo que a horas 0051 llamé al ACC, solicitando información, obteniendo respuesta en sentido de que ya había pasado a frecuencia de torre. Desde este momento no se tuvo contacto con dicha aeronave en ninguna frecuencia, se hizo varias llamadas en las frecuencias de 118,3, 123,9, sin obtener resultado alguno, igualmente los empleados de Eastern, estuvieron tratando de comunicarse. Oportunamente y después de haber consultado a las estaciones de Lima, Antofagasta, Arica, Santa Cruz, sin resultado positivo, se emitió los mensajes de fase de alerta y detresfa respectivamente. Cabe recalcar que en la frecuencia de torre 118.3 no se tuvo o no se hizo un solo contacto con EA980.

Es todo cuanto debo informar a su autoridad para fines consiguientes.

Atte:

  
Carlos Patón Loza.  
CONTROLADOR TORRE SLLP.

**ATTACHMENT # 3**

La Paz, 2 January 1985

Mr Eduardo Reyes I.  
Chief, ACC SLLP

Dear Sir:

I submit to you the following information regarding Flight EA-980: at 0027 hours, EA-980 calls on TMA frequency, 123.9, the call is answered and he is told to continue. EA-980 indicates he is at Flight Level 350 and estimates DAKON position at 0047; I authorize the flight to proceed to the La Paz VOR, advise him that no delays are expected, and inform him of the exact time in La Paz at the moment. EA-980 requests descent and he is cleared to FL 250, the aircraft advises that it is departing FL 350, his position is verified, and he is asked to report DAKON, the aircraft acknowledges instructions received. (I must note that the minimum enroute altitude on route UA320 is FL 230 and that this aircraft gave position reports at ESELA, CAMIRA, SUCRE, and estimated DAKON at 0037 on frequency 123.7 with SANTA CRUZ).

At 0037, EA-980 calls passing DAKON; my colleague, Luis Osorio, acknowledges receipt of the position report and asks for EA-980's present flight level, EA-980 reports that it is at FL 250 to which he is given permission to continue descent to 18,000 ft and to report departing FL 250. To this, EA-980 reports leaving FL 250, his position is verified and he is asked to report 20 miles out for hand-off to tower, which does not occur and all form of contact, on all available frequencies, is lost and the aircraft is declared in the ALERFA (alert) phase.

I would like to point out that EA-980 reported DAKON and that the minimum hard altitude in that sector between the 120° and 330° radials is 18,000 ft, and that between DAKON and the La Paz VOR, descent is authorized to 18,000 ft according to our charts.

In this situation we tried to get assistance from the adjacent control centers, and especially from Antofagasta, Lima, and Santiago de Chile, which is difficult because of the poor quality of our (HF) frequencies 10024, 10096, 6649, 8855, that are very noisy, as are the ISB frequencies, especially with Antofagasta which was impossible, keeping in mind that Arica was the alternate for EA-980.

At 0228 hours, DETRESFA (distress) phase was declared, during which we went to the adjacent control centers for any information on EA-980 which also turned up negative. To confirm what I have presented herein, I recommend you check with the tape recording of the events that includes everything in this letter.

Attentively,

Fernando Azuga H.  
ATC Controller



Airport, 2 Jan 85

Mr Eduardo Reyes  
Chief, ACC SLLP (La Paz)

Dear Sir:

I submit the following information to you relating to Eastern Flight 980 SGAS/SLLP. According to the position report passed by the TMA, this flight estimated the VOR at 0047 hours, at 18,000 ft altitude. Normally, this aircraft should have called La Paz Tower on 118.3 at the estimated time, but it did not do so, so I called the ACC at 0051 hours, requesting information; I was told that the aircraft had already been passed to tower frequency. From that moment, no further contact was made with the aircraft on any frequency; many calls were made on 118.3 and 123.9 without any results, similarly, the Eastern employees had been trying to contact the aircraft.

Subsequently, and after having called the stations at Lima, Antofagasta, Arica, and Santa Cruz, without any positive results, the alert phase and distress phase messages were transmitted. It must be reemphasized that there was never any contact with EA 980 on the tower frequency, 118.3.

This is all I have to report for your disposition.

Attentively,

Carlos Patón Loza  
Tower Controller SLLP (La Paz)

ATTACHMENT # 4

MINISTERIO DE DEFENSA NACIONAL



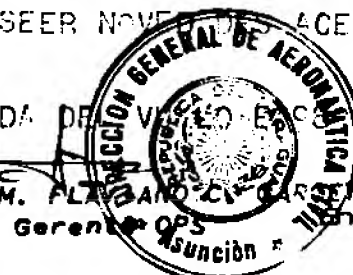
Dirección General de Aeronáutica Civil  
Dpto. de Telecomunicaciones Aeronáuticas  
Vice Pde. Sánchez y Mcal. López  
Asunción - Paraguay

**RADIOGRAMA  
RECIBIDO**

VUELO EA980 SELCALL KL-AH  
MATRICULA N819EA TIPO ACFT B727  
PROC/DESTINO SGAS/SLLP  
DIRECCION  
FECHA JAN 1ST, 85

- R. DEP EA980 SGAS/SLLP 2257 ASC FL 350 EST SGFI 2330 EST TNR ESELA 2350--  
ACC/2258/INTPH  
T. TNR EA980--SLLP/2259/MM SLCZ R.  
R. PSN EA980 SGFI 2330 FL 350 EST ESELA 2350--ACC/2330/INTPH  
R. PSN EA980 ESELA 2350 FL 350 EST SLCA 0002--SLCZ/2359/MM  
R. FASE ALERFA DECLARA SLLP A EA980 SIN QSO CON LA AERONAVE--SLLP/0145/MM  
R. ULTIMA PSN EA980 DAKON 0037 SIN OTRA INF--SLLP/0145/MM T. SR.BOGADO/OP  
SR. SOLER/SR.SOLIS  
R. FASE DETRESFA DECLARA SLLP AL VUELO EA980 A LAS 0228--SLLP/0228/MM  
O. 0252/0800 EN CONTINUO CONTACTO CON SLLP/SPIM/SLCZ/SCCL SOBRE EL VUELO  
EA980 STOP SIN LOGRARSE CONSEGUIR NINGUNA INFORMACION STOP  
O. 1010: SLCZ SIGUE INFORMANDO NO POSEER NOVEDAD ACERCA DEL EA980 HASTA  
EL MOMENTO--SLCZ/1010  
O. 1500: SIGUE SIN NOVEDAD DEL VUELO EA980--SLLP/SLCZ/1500/MM

*[Signature]*  
JULIO CESAR POLON  
JEFE DEL S.M.A.



Gerente OPS  
Asunción  
ARNALDO G. SOLER  
Encargado de Despacho  
D.G.A.C.

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## DIRECCION GENERAL DE AERONAUTICA CIVIL



Aeropuerto Internacional  
-Presidente Stroessner-

## PLAN DE VUELO

FLIGHT PLAN

ASUNCION  
PARAGUAY

INDICADOR DE PRIORIDAD  
Priority Indicator

INDICADOR(ES) DE DESTINATARIO(S)  
Addressee(s) Indicator(s)

KATLEAXI KMIABAD

HORA DE DEPOSITO  
Log Time

INDICADOR DEL REMITENTE  
Originator Indicator

01 ENE. 1985

IDENTIFICACION EXACTA DE DESTINATARIO(S) Y/O DEL REMITENTE  
Specific identification of addressee(s) and/or originator

DESCRIPCION  
Description

IDENTIFICACION DE LA AERONAVE  
Aircraft identification  
and SSR data

REGLAS DE VUELO Y TIPOS DE VUELO  
Flight rules and type of flight

≡ (FPL) — EA 980

— IS

NUMERO Y TIPO DE AERONAVES, CATEGORIA DE ESTELA  
Number and type of aircraft  
and wake turbulence category

EQUIP Equipment  
COM/NAV/APP - SSR

— B 727-200 / M

— S

/ C

AERODROMO DE SALIDA Y HORA  
Aerodrome of departure and time

LIMITES DE LA FIR Y HORAS PREVISTAS  
FIR boundaries & estimated times

— SGAS 2240 → SLLP 2340

VELOCIDAD DE CRUCERO

NIVEL Level

RUTA Route

— 0460 F 350

→ UA 320D PAR

AERODROMO DE DESTINO Y HORA  
Aerodrome of destination and time

AERODROMO(S) DE ALTERNATIVA  
Alternate aerodrome(s)

— SLLP 0040

→ SCAR

DATOS ADICIONALES  
Other information

— REG: N819EA

EN LOS MENSAJES FPL NO HAY QUE TRANSMITIR ESTOS DATOS  
Not to be transmitted in FPL messages

INFORMACION COMPLEMENTARIA  
Supplementary information

AUTONOMIA  
Endurance

PERSONAS A BORDO  
Persons on board

EQUIPO DE EMERGENCIA Y SUPERVIVENCIA  
Emergency & survival equipment

COMBUSTIBLE

0330

→ POB/

→ RDO/ 121,5 → 243

EQUIPO  
Equipment

CHALECOS SALVAVIDAS  
Life jackets

FRECUENCIA  
Frequency

POLAR → DESERTICO → MARITIMO → SELVA → CHALECOS → LUZ → FLUORESCENTE →

PISTAS PNEUMATICAS COLOR  
Runway Colour

NUMERO  
Number

OPCIONES TOTAL  
Options Total

EQUIPO ADICIONAL  
Other equipment

CIENITA

Nombre del piloto al mando  
Name of pilot in command

DEL FLAVIANO C. BARRERA  
Comando de OPS

CAIDRELL J.C. BAEZ / OPS



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ATTACHMENT # 5

RCV MSG 0 TIME RADAY . . . N.T.B.  
02310 2001 023/85  
QST FHUA FRA MHTSA UMTA RSPA CONN MAR 230 MAR 740 MAR  
DET-1 OIC RM 721L RM 2122 RM  
MARAD TELECOMMUNICATIONS RM F1-1303 PH 382-6108/09 TWX 710-822-1

OTTUZYUW RUEHLPAD562 0231959-UUUU--RUEOCBA.

ZNR UUUUU ZZH

0 231957Z JAN 85

FM AMEMBASSY LA PAZ

TO RUEHC/SECSTATE WASHDC IMMEDIATE 3739

INFO RUEOCBA/FAA WASHDC

RUMTERA/FAA AERO CNTR OKLAHOMA CITY OK

RHCGGIL/FAA ATLANTA

RUESBG/AMEMBASSY BOGOTA 3144

RUEHBU/AMEMBASSY BUENOS AIRES 6162

RUEHBE/AMEMBASSY BRASILIA 338L

RUESAS/AMEMBASSY ASUNCION 3170

RUEHCY/AMEMBASSY CARACAS 4093

RUEHPE/AMEMBASSY LIMA 0951

RUESQI/AMEMBASSY QUITO 3034

RUESNA/AMEMBASSY SANTIAGO 569L

BT

UNCLAS LA PAZ 00562

FAA WASHDC ALSO PASS TO HTSB WASHDC - JACK YOUNG

C.O. 12356: N/A

TAGE: EAIR, BL

SUBJECT: FAA FLIGHT CHECK OF LA PAZ INTERNATIONAL  
AIRPORT NAVAIDS

REF: LA PAZ 41L

1. FAA FLIGHT CHECK 727 ARRIVED IN VIRU VIRU AIRPORT,  
SANTA CRUZ ON JANUARY 21 AT 1500. FLIGHT CHECKS OF  
LA PAZ INTERNATIONAL AIRPORT AND VIRU VIRU INTER-  
NATIONAL NAVAIDS WERE CONDUCTED ON THE MORNING OF  
JANUARY 22.

2. FLIGHT CHECK TEAM PERMITTED BOLIVIAN AUTHORITIES  
AND EMBASSY OFFICER ON BOARD AIRCRAFT DURING FLIGHT  
CHECK OPERATION. THE FAA TEAM PROVIDED GOVERNMENT  
OF BOLIVIA OFFICIALS A THOROUGH BRIEFING OF RESULTS  
OF FLIGHT CHECK AND A WRITTEN COPY OF THE REPORT.  
ACCORDING TO FAA TEAM LEADER WILLIAM ARDIES, BOTH  
AIRPORTS' NAVAIDS WERE FOUND IN SATISFACTORY CON-  
DITION.

--

3. EMBASSY IS FURNISHING COPIES OF THE FLIGHT CHECK  
REPORT TO DEPARTMENT AND HTSB (JOHN YOUNG). CORR  
BT  
00562

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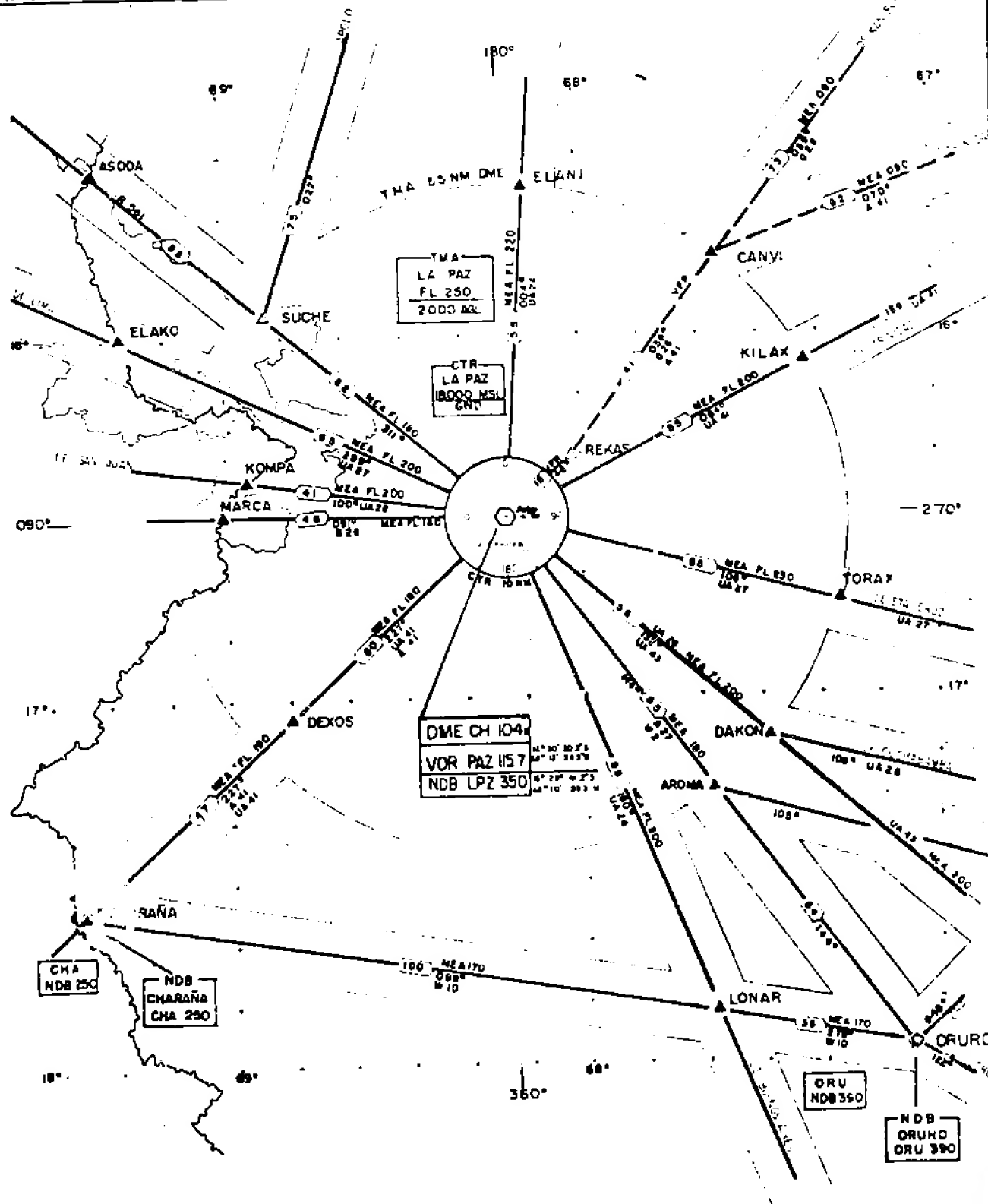
ATTACHMENT # 6

AASANA DEPARTAMENTO DE OPERACIONES  
LA PAZ BOLIVIA

RUTAS DE LLEGADAS

TMA LA PAZ

CARTA DE AREA TERMINAL AASANA



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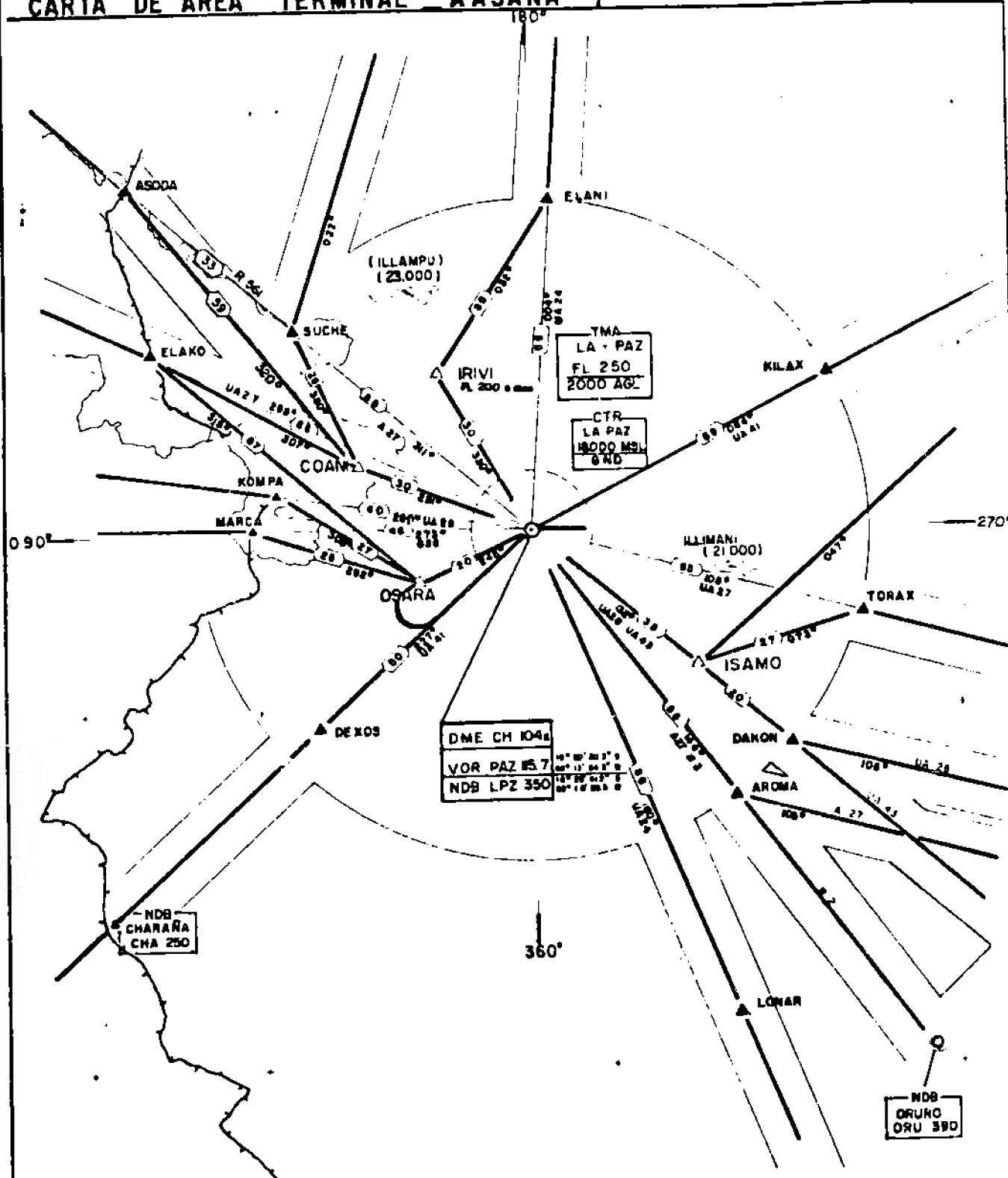


AASANA DEPARTAMENTO DE OPERACIONES  
LA PAZ BOLIVIA

RUTAS DE SALIDA

TMA LA PAZ

CARTA DE AREA TERMINAL AASANA



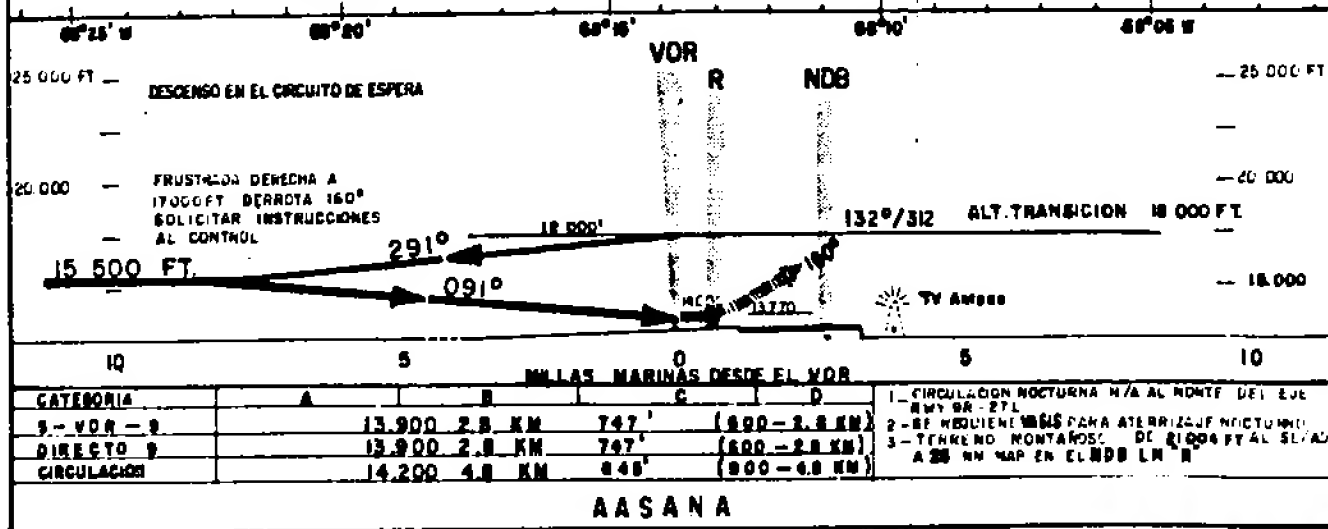
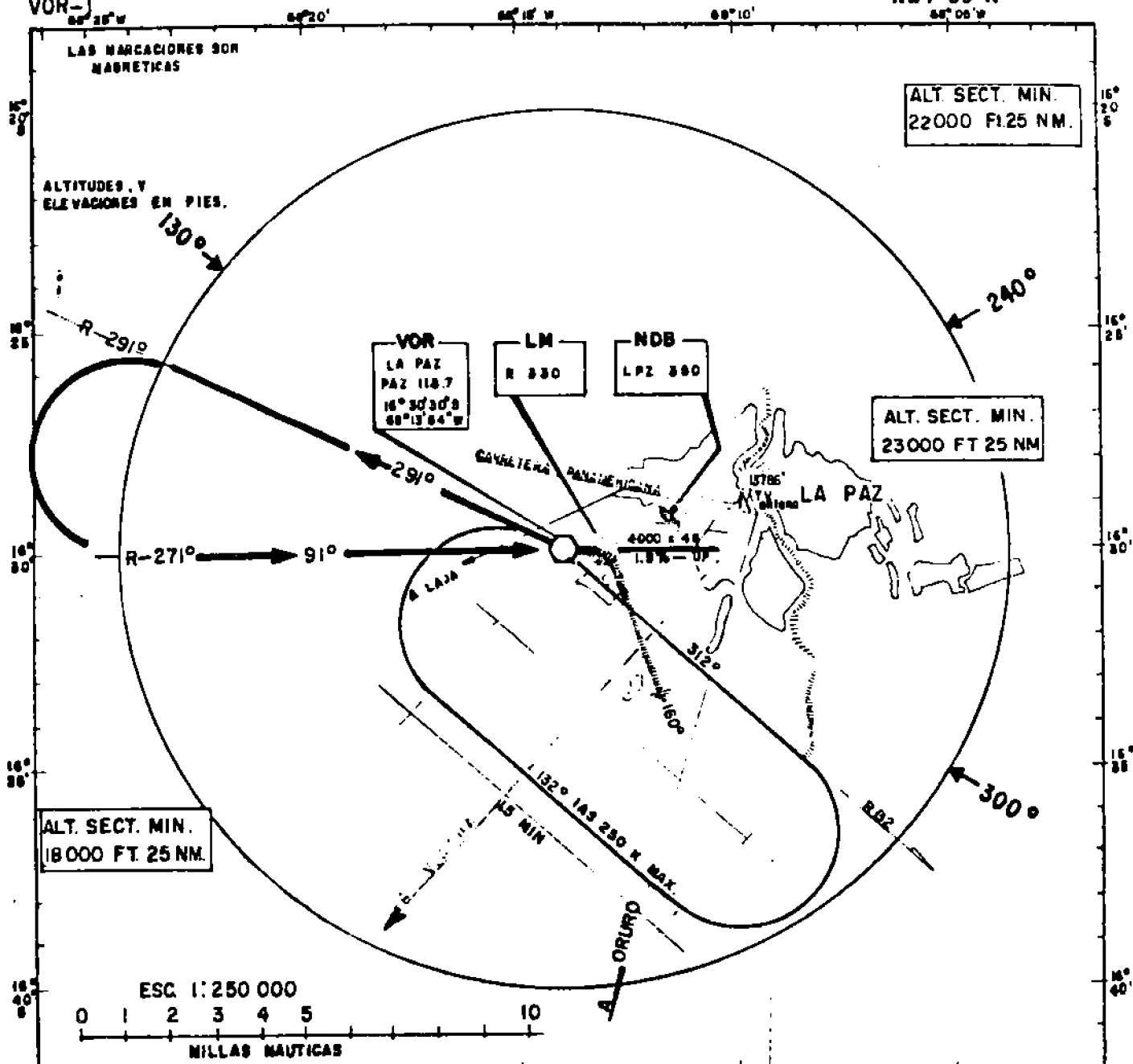
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AIP BOLIVIA  
CARTA DE INFORMACION  
POR INSTRUMENTOS OACI  
VOR-J

ELEV.  
THR 09 13106 FT

APP 119.5  
TWR 118.3

J. F. KENNEDY INTL. (SLLP)  
LA PAZ BOLIVIA  
RWY 09 R

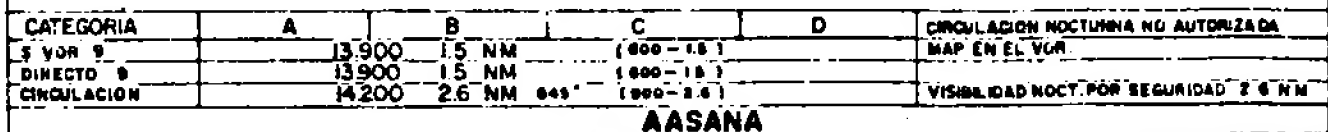


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LP. 26-NOV-81  
AMP - 014

31

LA PAZ BOLIVIA RWY 09-R  
ELEV. APT. [REDACTED] FT. 330 R



LP. 26-NOV-81  
AMD - 014

38

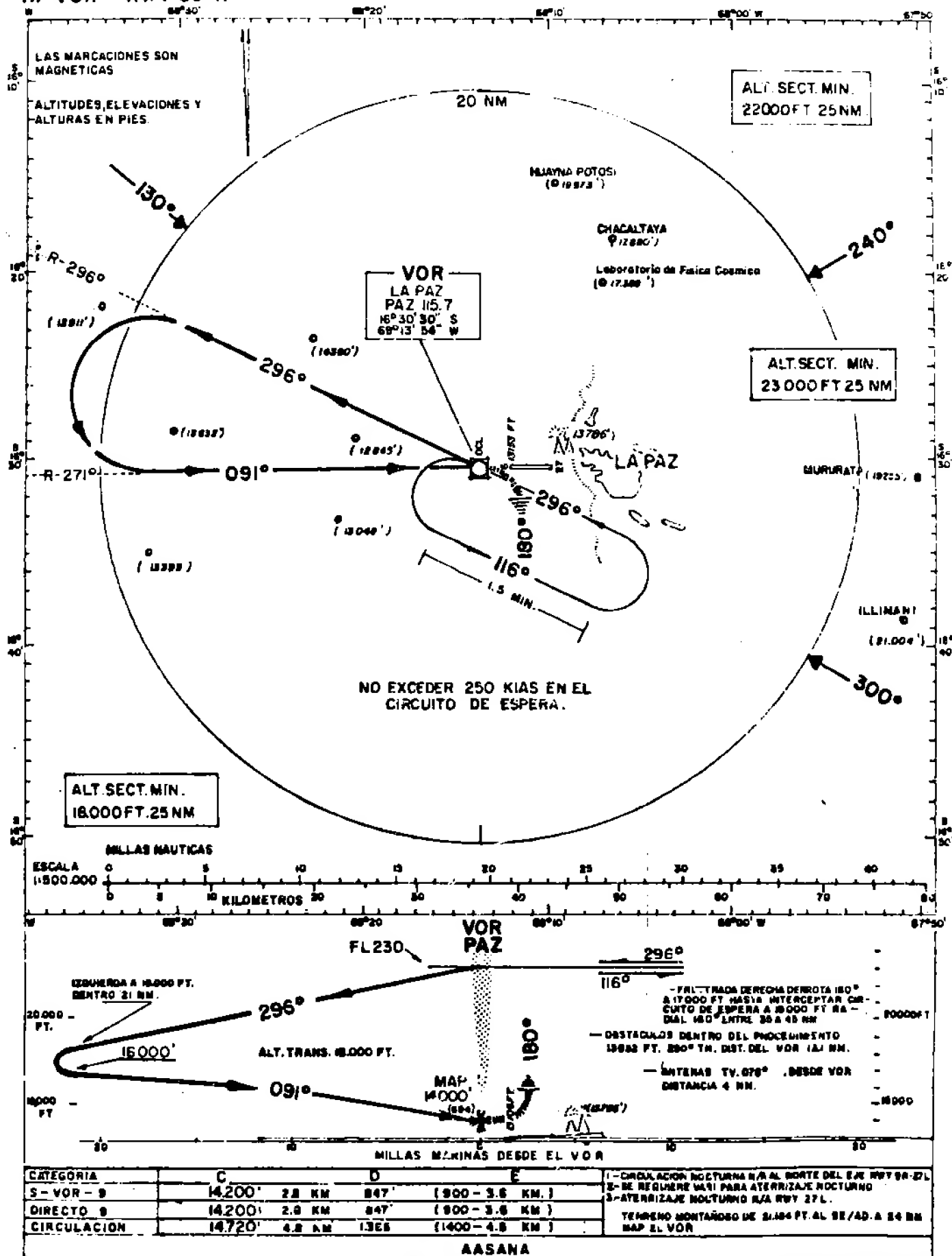
CARTA DE NAVEGACION DE ALTURA  
REACH - OACI

ELEV. THR 09 13106 FT.

APP 119.5  
TWR 118.3

KENNEDY INTL. (SLLP)  
LA PAZ-BOLIVIA VOR RWY 09 F  
ELEV. APP. 13,310 FT

HI-VOR RWY 09 R



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LP. 26-NOV-81  
AMD - 014

33

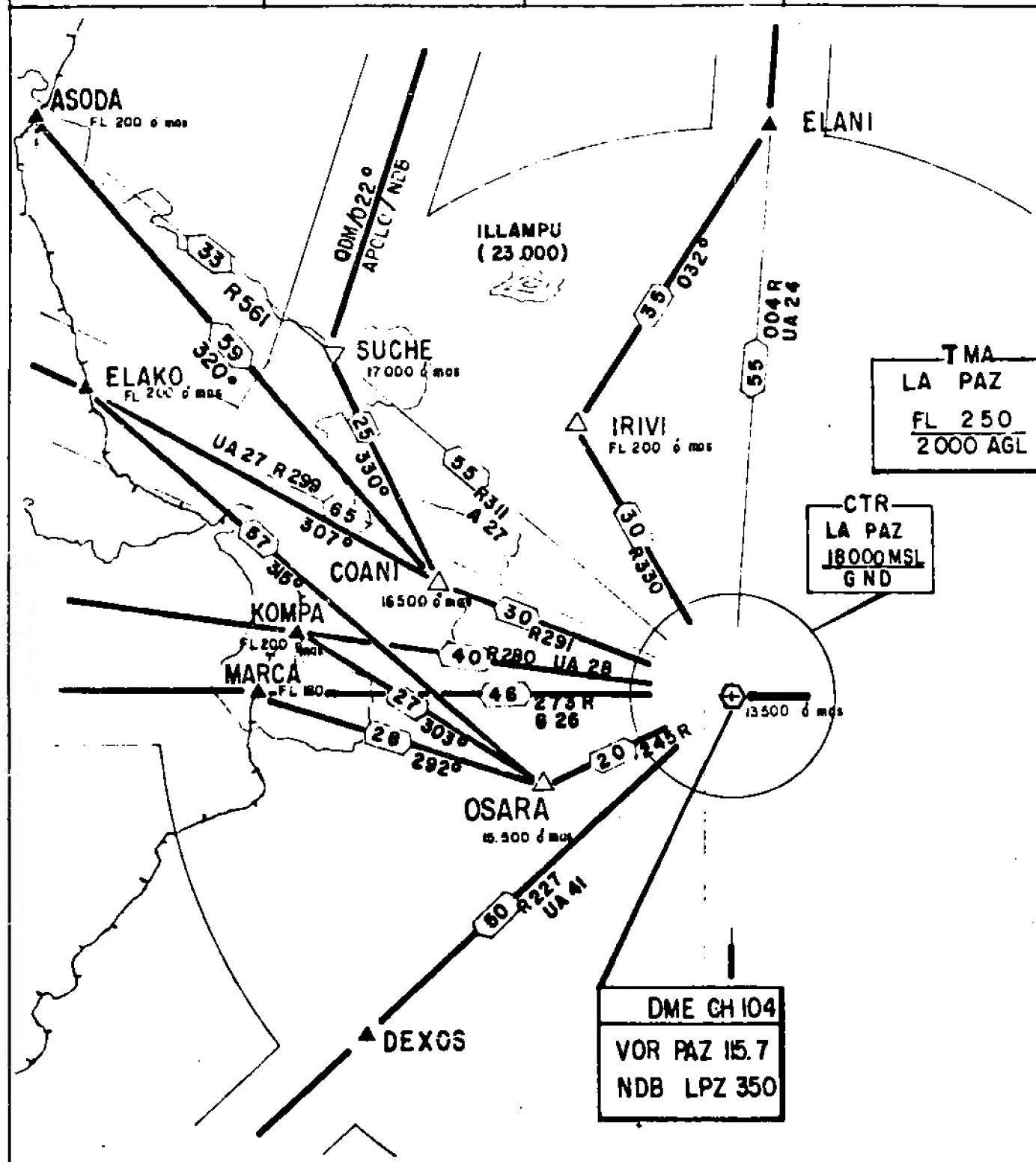
CARTA DE SALIDA  
POR INSTRUMENTOS

COANI UNO  
OSARA UNO

IRIV! UNQ  
DEXOS UNQ

HAC 4-2.9  
J.F.KENNEDY INTL.  
LA PAZ BOLIVIA  
RWY 09 R

TORRE	CONTROL	CENTRO
118.3 MHz	APROXIMACION	123.9 MHz
	119.5 MHz	128.2 MHz



DESPEQUE DIA:      TECHO      DM.—VISIBILIDAD      I. KM

DESPEQUE NOCHE: TECNICO O M... VISIBILIDAD 1, KM

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LP 26-NOV-81  
AMD - 014 30

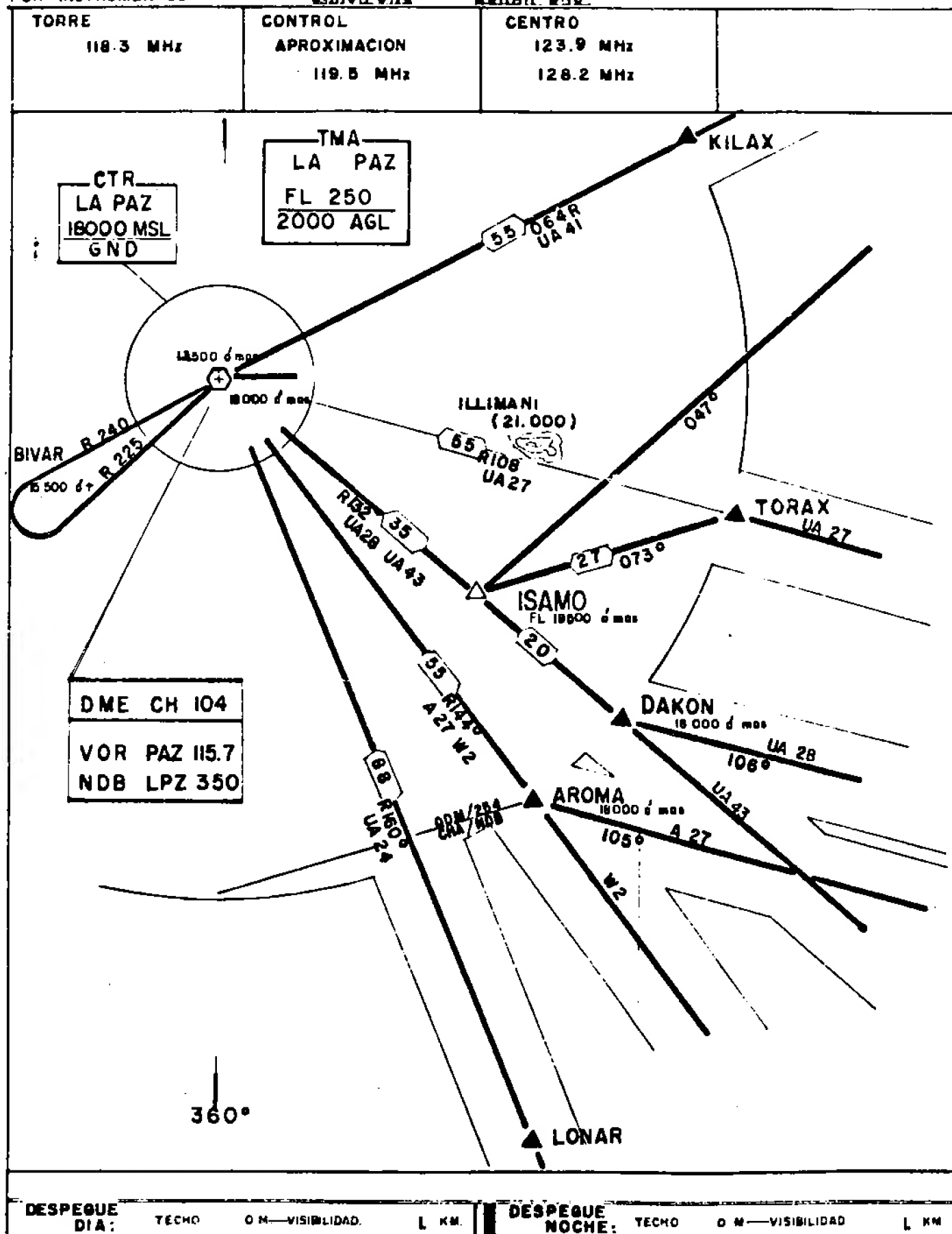
CARTA DE  DA  
POR INSTRUMENTOS

ISAMO UNO  
DAKON UNO

BIVAR UNO  
LONAR UNO

AROMA

J.F. KENNEDY INTL.  
LA PAZ BOLIVIA  
RWY 09 R



LP. 26-NOV-81  
AMD - 014

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ATTACHMENT # 7



PROCEDIMIENTO DE APROXIMACION "ILS"

AEROPUERTO INTERNACIONAL JOHN F. KENNEDY - LA PAZ

1. PROCEDIMIENTO DE ESPERA

- 1.1 Radial 132
- 1.2 Derrota de acercamiento 312°
- 1.3 Altitud mínima en la espera, 18.000 pies QNH (Altitud de Transición)
- 1.4 Todos los virajes a la izquierda

2. PROCEDIMIENTO DE APROXIMACION (IAL)

2.1 Aproximación Intermedia: Alejamiento 294°; descendiendo a 15.000 pies. Viraje a la izquierda para interceptar el curso del localizador del ILS a 15.500 pies. Seguir el curso del localizador 091° descendiendo de 15.500 a 15.000, interceptar la senda de planeo (GP) en el punto de referencia de aproximación final (FAF) ubicado a 7.08 NM del DME/ILS.

2.2 Aproximación Final: Iniciar descenso en el FAF siguiendo el GP de 2,5° hasta completar el aterrizaje con pista a la vista, o si al alcanzar la altitud de decisión de 13.360 pies como mínimo, no se tiene pista a la vista, iniciase el procedimiento de aproximación frustrada.

3. APROXIMACION FRUSTRADA

3.1 Subir en el R091 hasta alcanzar el punto de viraje (TP) a 2NM del DME/ILS cruzándolo a 13.680 pies o superior. Iniciar viraje a la derecha, derrota 180° para interceptar y seguir el R160, cruzar punto 25NM DME/VOR a 17.000 pies, continuar hacia el punto de espera "ATIPO" subiendo a 18.000 pies o solicitar instrucciones al control para regresar al VOR.

3.2	PUNTO "ATIPO"	R160	35NM	
		QDM	135°	ORU/NDB
		QDM	249°	CHA/NDB

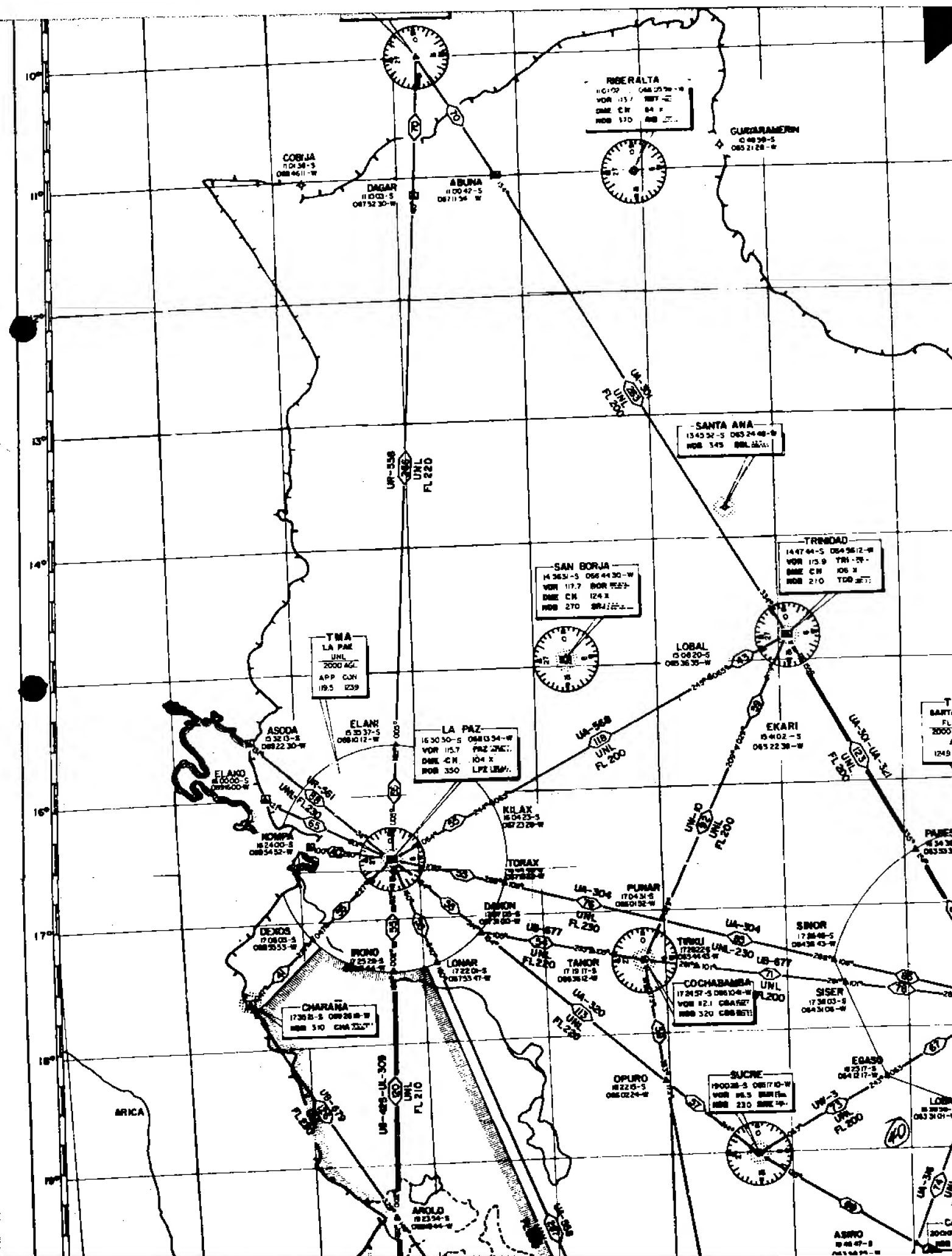
4. ESPERA EN APROXIMACION FRUSTRADA

4.1 En el punto "ATIPO" se establece un circuito de espera entre 35NM y 45NM del VOR/DME. Radial 132; derrota de acercamiento 340°, altitud 18.000 pies, todos los virajes a la izquierda.

5. ALTITUDES MINIMAS DE SECTOR

Entre R330 y R060	ALT.	22.000 Ft.
Entre R060 y R120	ALT.	23.000 Ft.
Entre R120 y R330	ALT.	18.000 Ft.

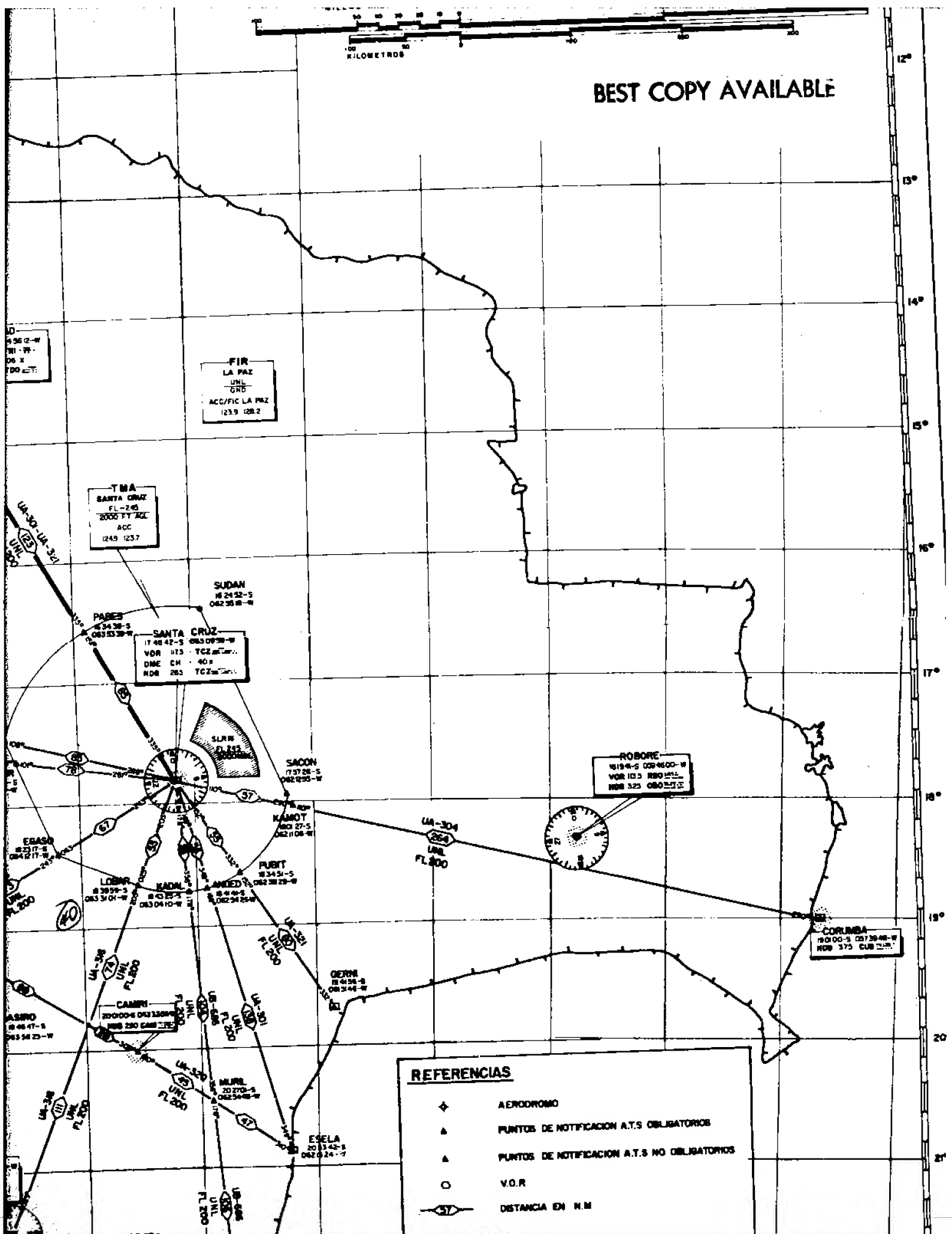
ATTACHMENT # 8





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KILOMETROS



FIR  
LA PAZ  
UNL  
GND  
ACC/FIC LA PAZ  
123.9 128.2

TMA  
SANTA CRUZ  
FL-240  
2000 FT AGL  
ACC  
124.9 123.7

SANTA CRUZ  
1748 42-3  
VOR 113 TCE 113  
DME 113  
RDB 263 TCE 113

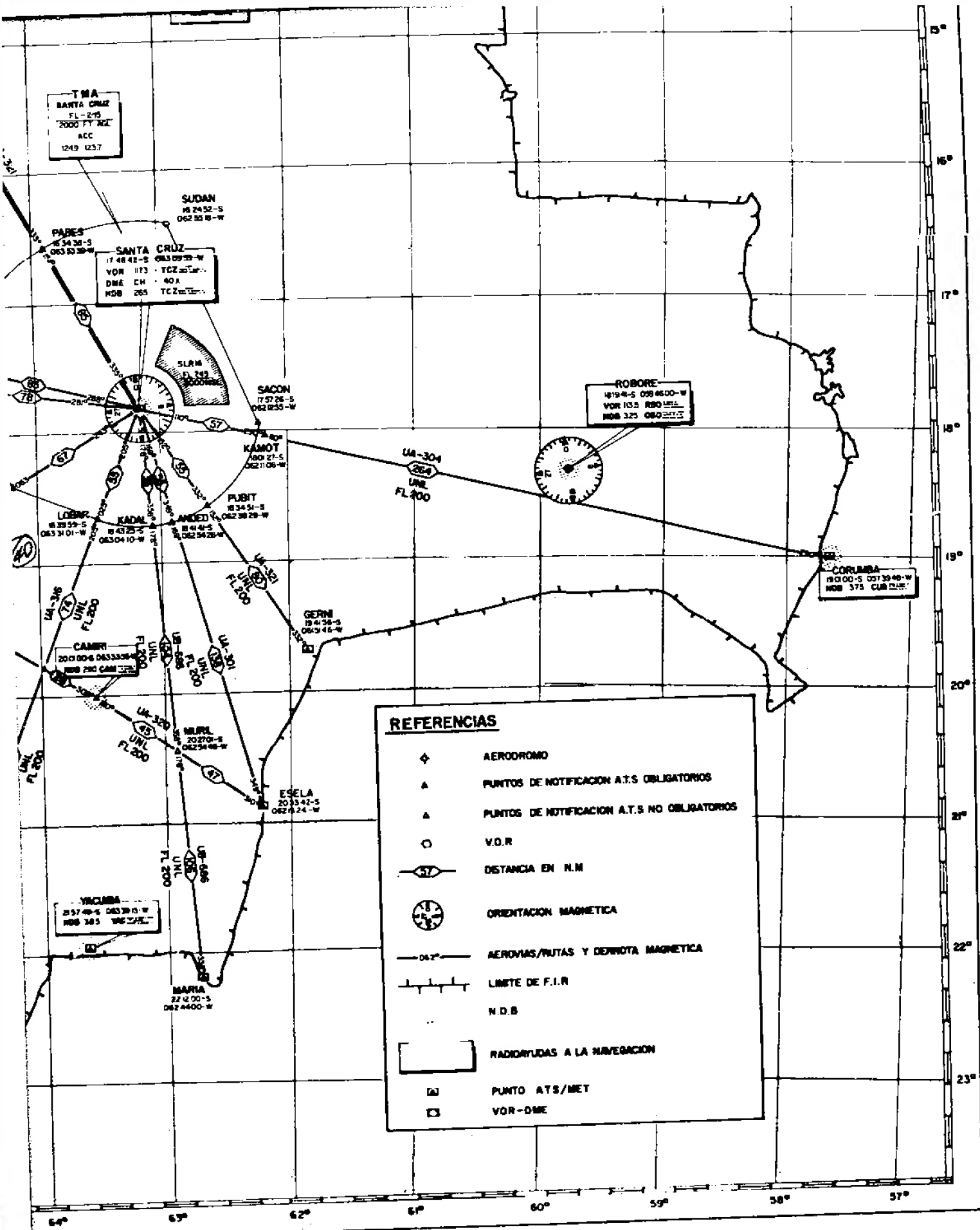
SUDAN  
1624 32-5  
062 36 18-W

ROBOTE  
1619 4-5 020 4600-W  
VOR 113.5 RDB 113.5  
RDB 325 060 31.5

COCHABAMBA  
1600 00-5 021 30 48-W  
RDB 375 060 12.5

REFERENCIAS

- ◆ AERODROMO
- ▲ PUNTOS DE NOTIFICACION A.T.S. OBLIGATORIOS
- ▲ PUNTOS DE NOTIFICACION A.T.S. NO OBLIGATORIOS
- V.O.R
- DISTANCIA EN N.M



BEST COPY AVAILABLE

40 b

40 c

GRU  
ACC/FIC LA PAZ  
123.9 128.2

TMA  
SANTA CRUZ  
FL-245  
2000 FT AGL  
ACC  
124.9 123.7

SUDAN  
16 24 52-S  
062 55 18-W

SANTA CRUZ  
17 48 42-S  
063 09 39-W  
VOR 112.3  
DME CH 40X  
HDB 265

SLUR  
21 245  
2000000000

SACON  
17 57 26-S  
062 02 55-W

KAMOT  
18 01 27-S  
062 11 06-W

PURBY  
18 34 51-S  
062 36 29-W

ANDER  
18 43 25-S  
062 34 26-W

GERM  
18 41 54-S  
062 34 46-W

ESELA  
20 33 42-S  
062 05 14-W

MURIL  
20 27 01-S  
062 34 46-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

LA 406  
20 33 42-S  
062 05 14-W

ROBORE  
18 19 14-S  
062 46 00-W  
VOR 112.3  
HDB 325

CORUMBIA  
18 00 00-S  
057 39 48-W  
HDB 375

YACUBA  
21 57 48-S  
062 39 15-W  
HDB 385

MARIA  
22 12 00-S  
062 44 00-W

# REFERENCIAS

- ◆ AERODROMO
- ▲ PUNTOS DE NOTIFICACION A.T.S OBLIGATORIOS
- ▲ PUNTOS DE NOTIFICACION A.T.S NO OBLIGATORIOS
- V.O.R
- 57— DISTANCIA EN N.M
- ☉ ORIENTACION MAGNETICA
- 042°— AEROVIAS/PUJAS Y DERROTA MAGNETICA
- LIMITES DE F.I.R
- N.O.B
- RADIOAYUDAS A LA NAVEGACION
- ☐ PUNTO A.T.S/MET
- ☐ VOR-DME

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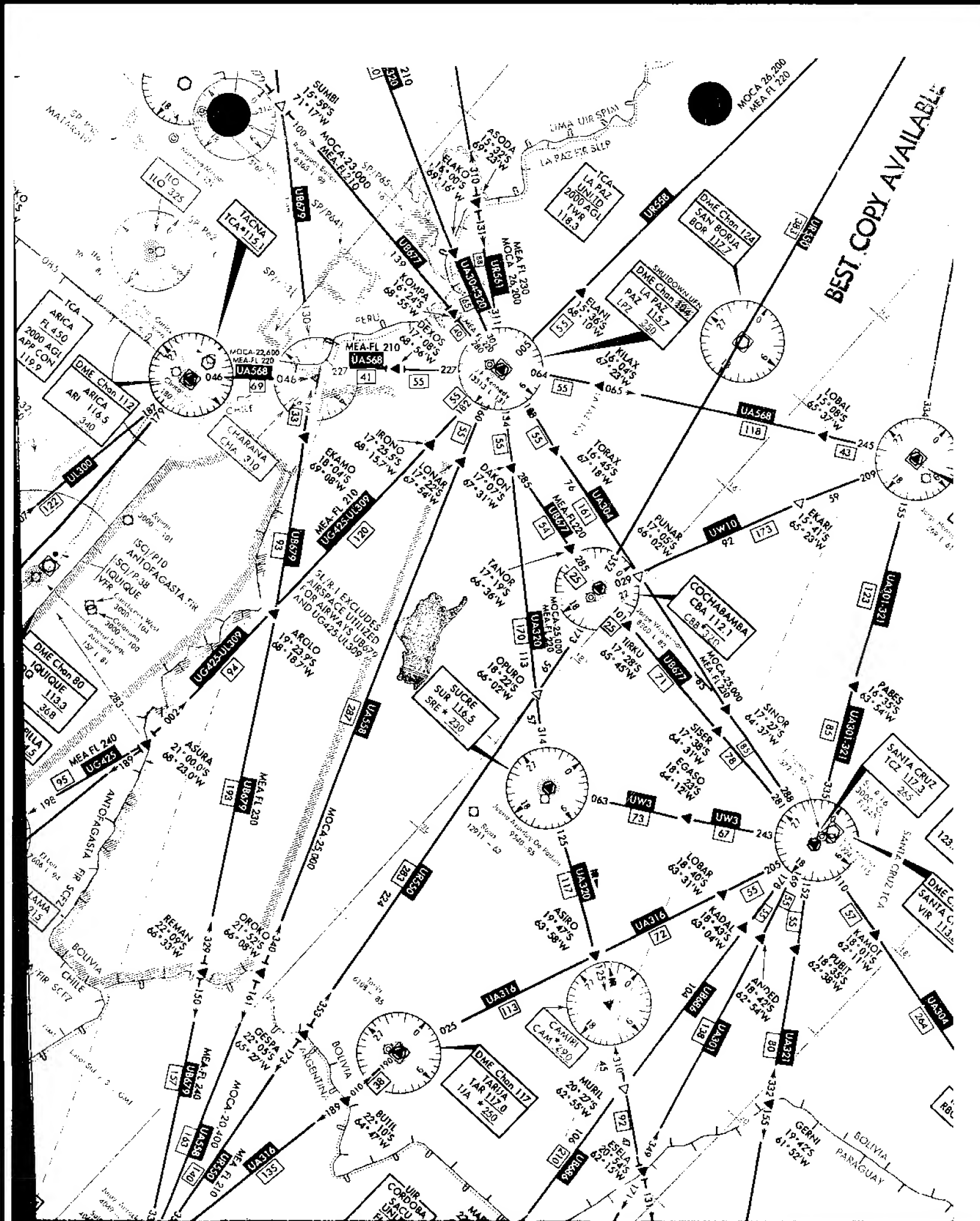
40 b

40 c

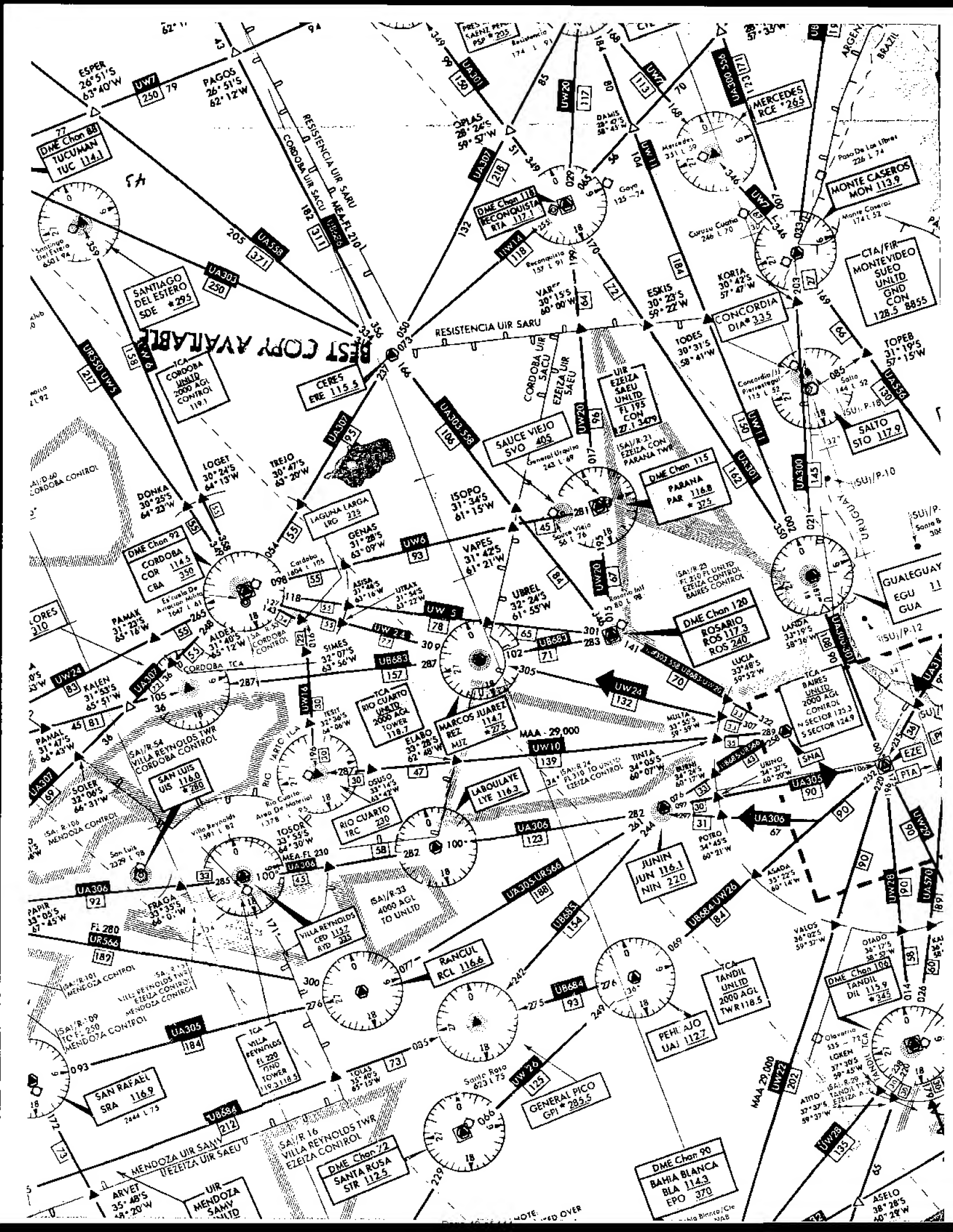
ATTACHMENT # 9



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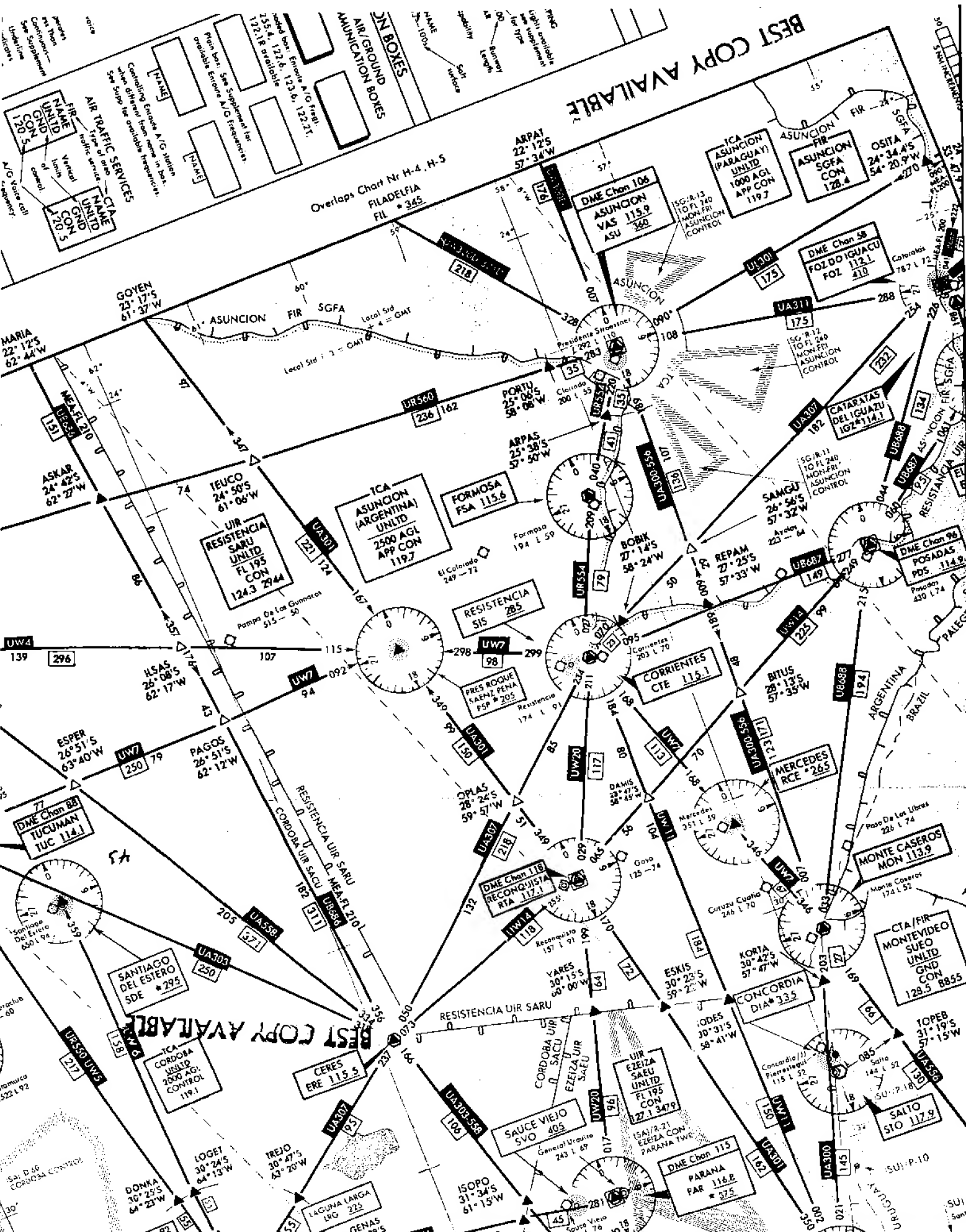






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Overlaps Chart No. H-4, H-5  
FILADELFA  
FIL # 345



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**ATTACHMENT # 10**

44

DOD  
FLIGHT INFORMATION PUBLICATION  
(TERMINAL)

# HIGH AND LOW ALTITUDE CARIBBEAN AND SOUTH AMERICA

AIRPORT DIAGRAMS  
INSTRUMENT APPROACH PROCEDURES  
STANDARD INSTRUMENT DEPARTURES  
RADAR INSTRUMENT APPROACH MINIMUMS

EFFECTIVE 20 DEC 84  
TO 14 FEB 85

PUBLISHED IN ACCORDANCE WITH  
INTER-AGENCY AIR CARTOGRAPHIC COMMITTEE SPECIFICATIONS AND AGREEMENTS  
APPROVED BY  
DEPARTMENT OF DEFENSE ★ DEPARTMENT OF COMMERCE  
FEDERAL AVIATION ADMINISTRATION



Published by  
DEFENSE MAPPING AGENCY AEROSPACE CENTER  
3200 SOUTH SECOND STREET  
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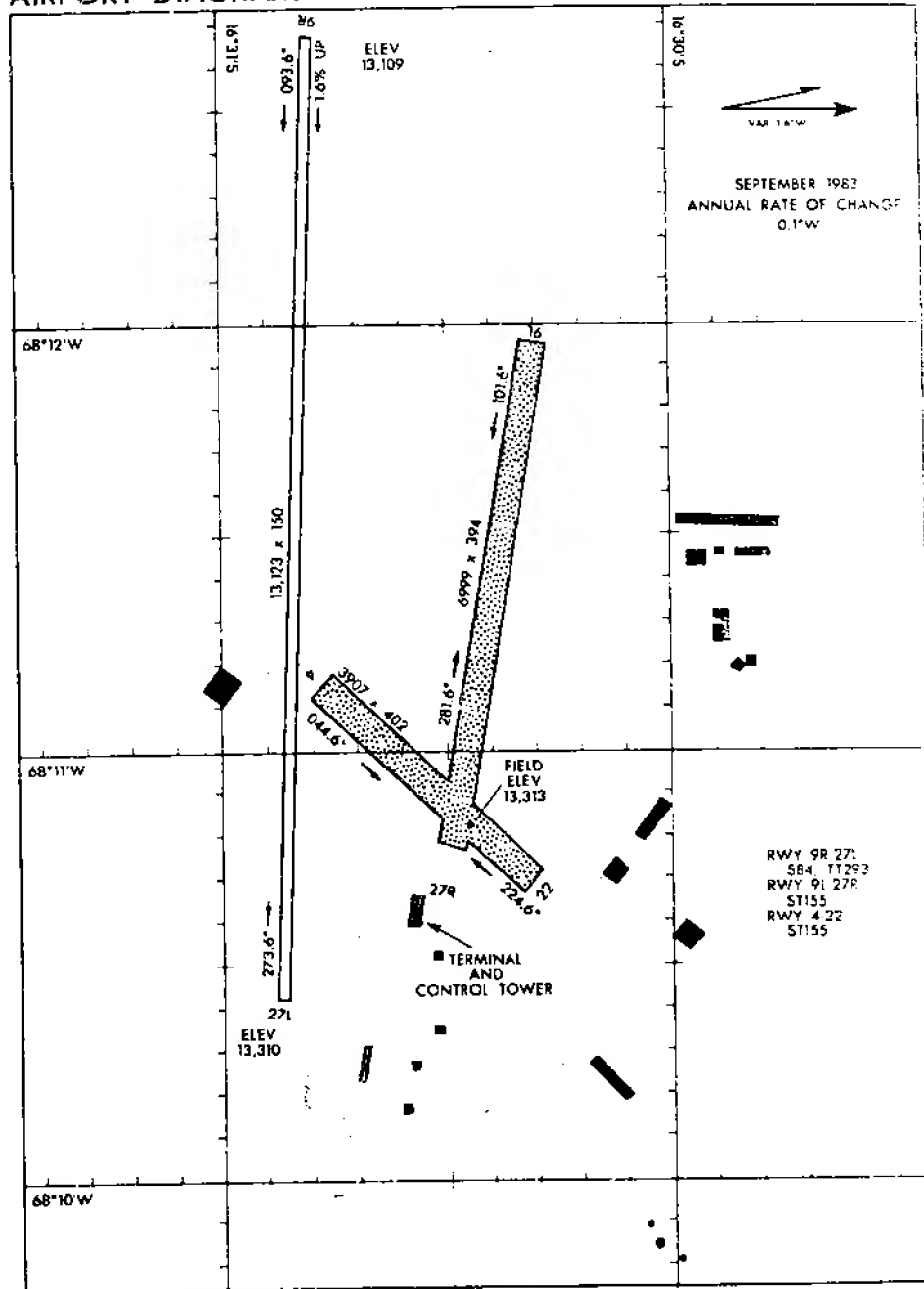
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45

# AIRPORT DIAGRAM

150  
AFD-1982

J. F. KENNEDY INTL (SLIP)  
LA PAZ, BOI VLA



# AIRPORT DIAGRAM

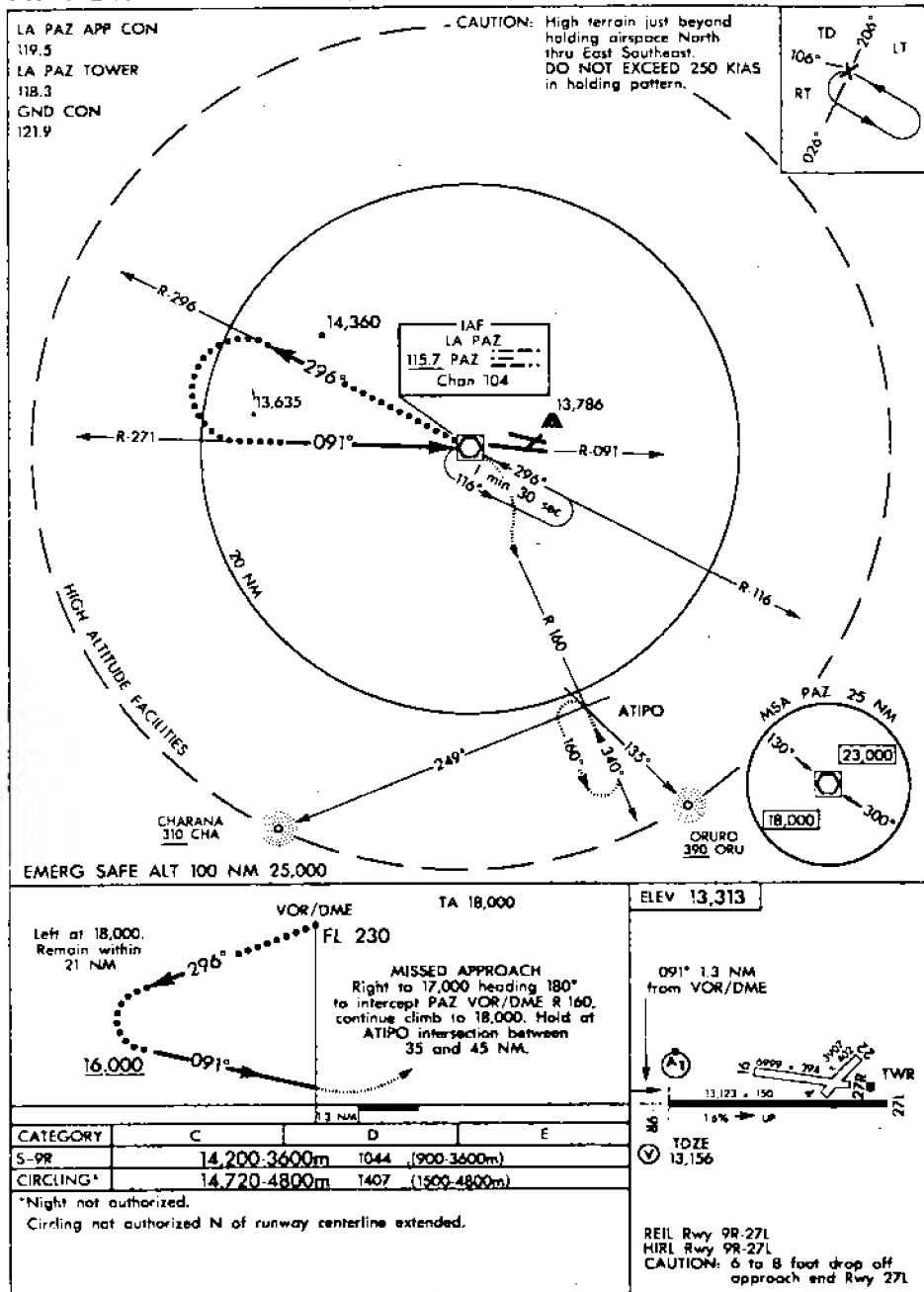
WGS DATUM  
150

LA PAZ, BOLIVIA  
J. F. KENNEDY INTL (SLIP)

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48

# **HI-VOR RWY 9R** (USAF) JAL-1982.01 (AASANA) 143 **J. F. KENNEDY INTL (SLLP)** LA PAZ, BOLIVIA

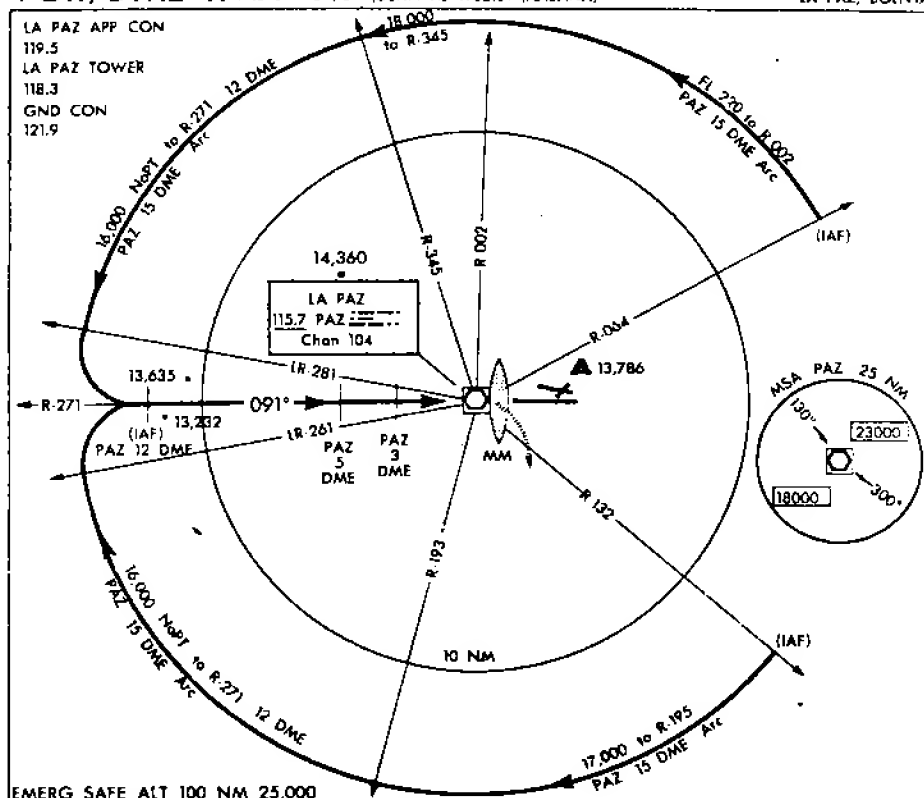


**HI-VOR RWY 9R**  
 16°30'5"-68°11'W

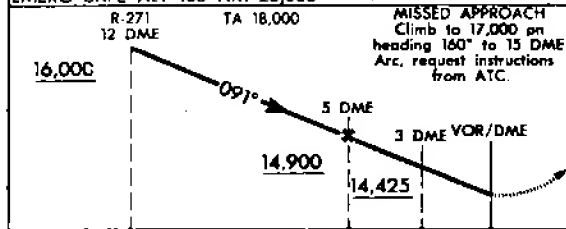
143  
**J. F. KENNEDY INTL (SLLP)**  
 LA PAZ, BOLIVIA

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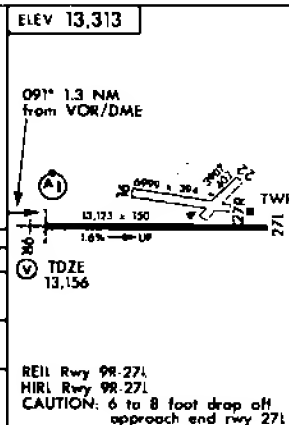


EMERG SAFE ALT 100 NM 25,000



CATEGORY	A	B	C	D
S-9R	13,900-2800m	744	(600-2800m)	
CIRCLING*	14,200-4800m	887	(900-4800m)	

\*Night cycling not authorized

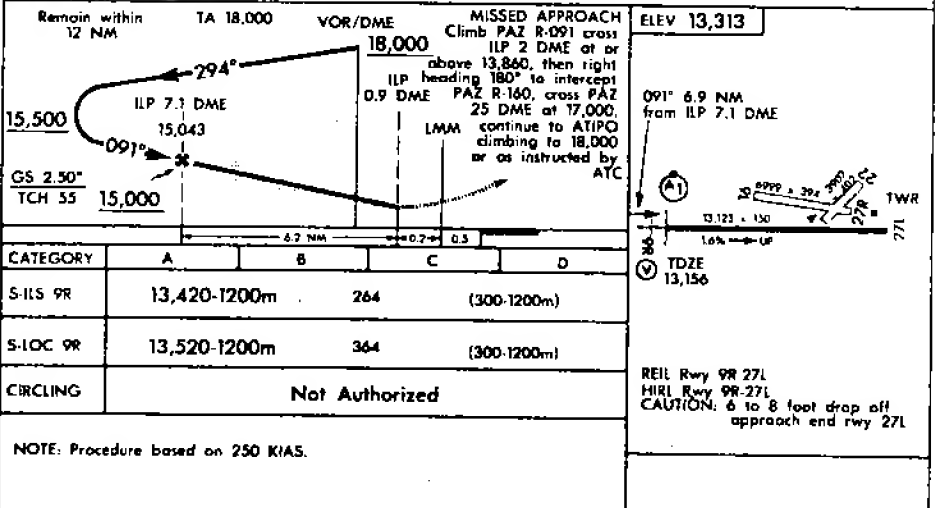
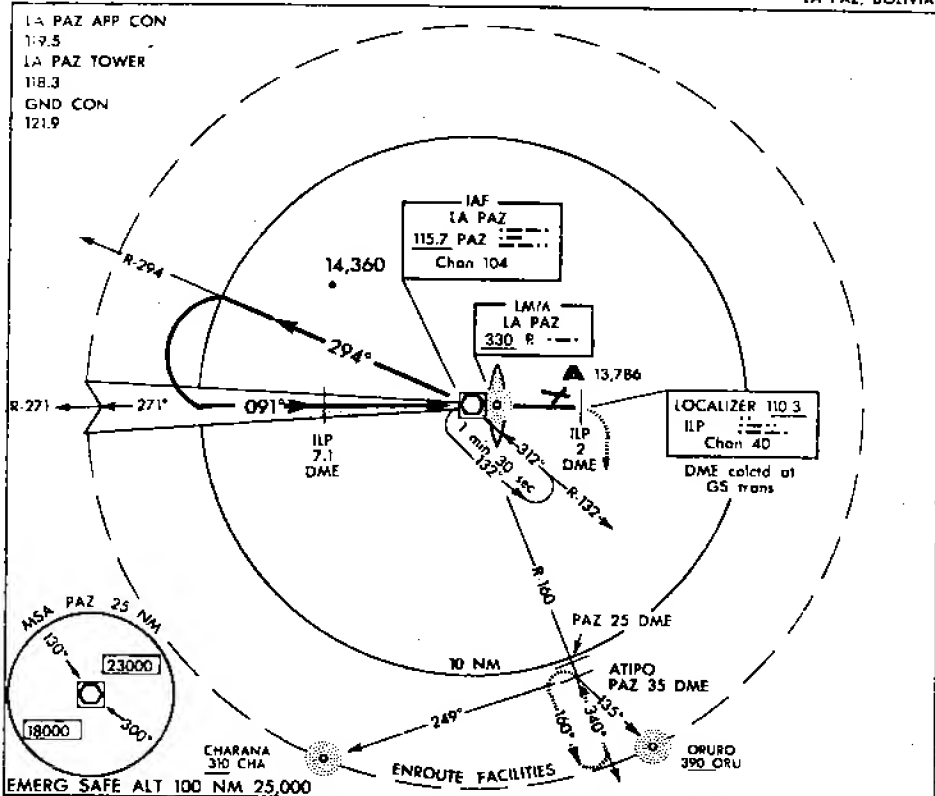


LA PAZ, BOLIVIA  
J. F. KENNEDY INTL (SLLP)

# ILS/DME RWY 9R

(USAF) AL-1982.02 (AASANA)

J. F. KENNEDY INTL (SLIP)  
LA PAZ, BOLIVIA



## ILS/DME RWY 9R

16°30'S 68°11'W  
141

LA PAZ, BOLIVIA  
J. F. KENNEDY INTL (SLIP)

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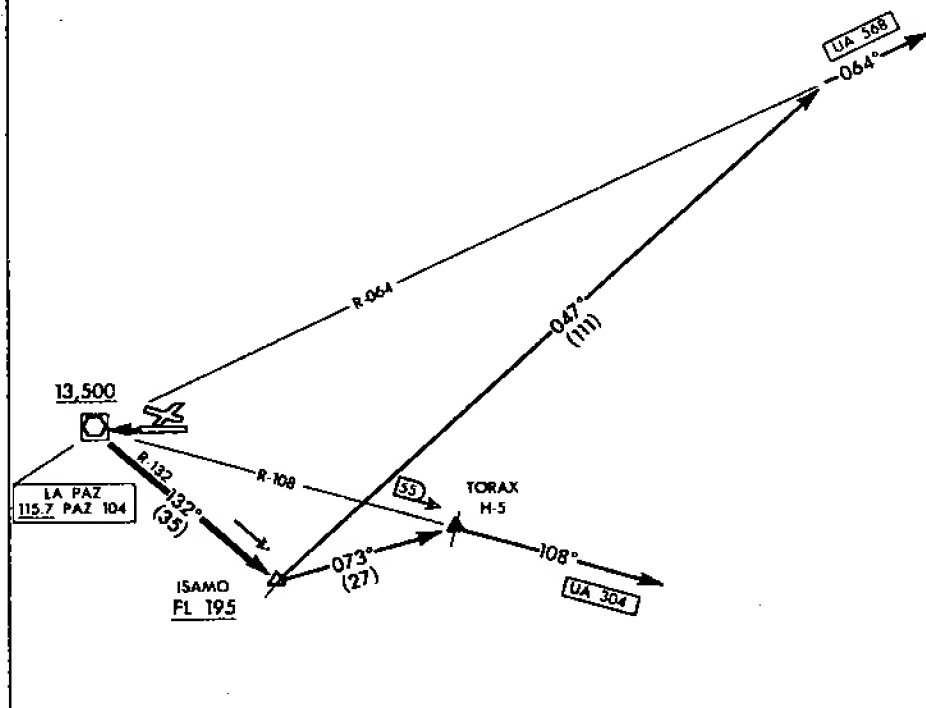
# ISAMO 1 DEPARTURE

SH-1982.02

J. F. KENNEDY INTL  
LA PAZ, BOLIVIA

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000.  
Minimum rate of climb 670 fpm  
based on 180 KIAS.



## DEPARTURE ROUTE DESCRIPTION

**TAKE-OFF RWY 27L:** Cross LA PAZ VOR/DME at or above 13,500, intercept PAZ R-132 to cross ISAMO INT at or above FL 195. Then. . .

. . .For UA304: HDG 073° to intercept PAZ R-108 at TORAX INT.

. . .For UA568: HDG 047° to intercept PAZ R-064.

# ISAMO 1 DEPARTURE

149

LA PAZ, BOLIVIA  
J. F. KENNEDY INTL

BEST COPY AVAILABLE

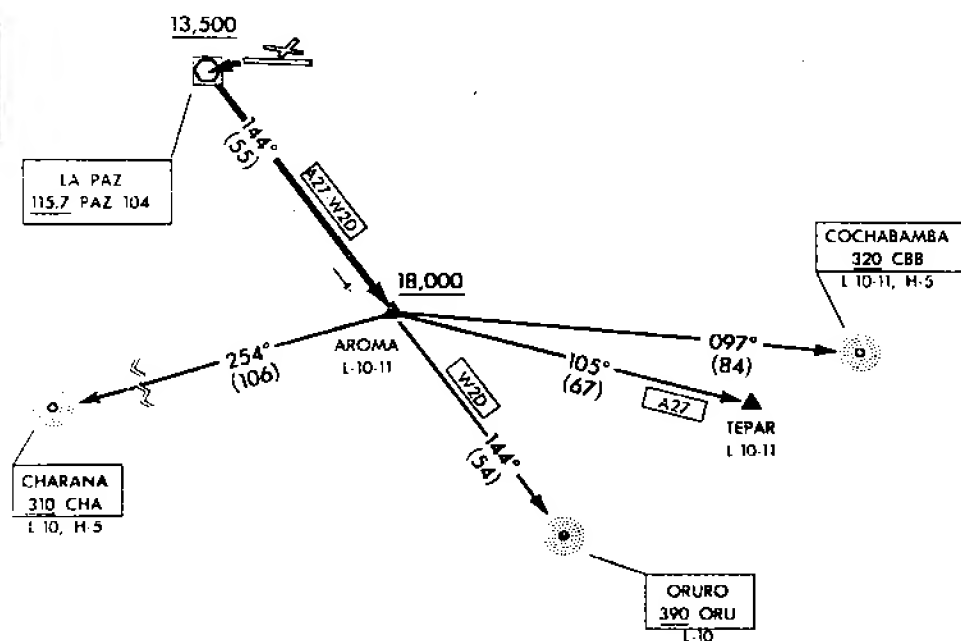
# AROMA 1 DEPARTURE

SHL-1982.02

J F KENNEDY INTL  
LA PAZ, BOLIVIA

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000.  
Minimum rate of climb 870 fpm  
to 13,500 at PAZ VOR  
based on 180 KIAS.



## DEPARTURE ROUTE DESCRIPTION

**TAKE-OFF RWY 27L:** Direct to and cross PAZ VOR/DME at or above 13,500, intercept PAZ R-144 to cross AROMA INT at or above 18,000.

Then . . . .

**FOR A27:** Heading 105° to TEPAR INT, maintain 18,000 or continue climb to cruising flight level.

**FOR W2D:** Maintain 18,000 or continue climb to cruising flight level.

AROMA 1 DEPARTURE

144

LA PAZ, BOLIVIA  
J F KENNEDY INTL

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145

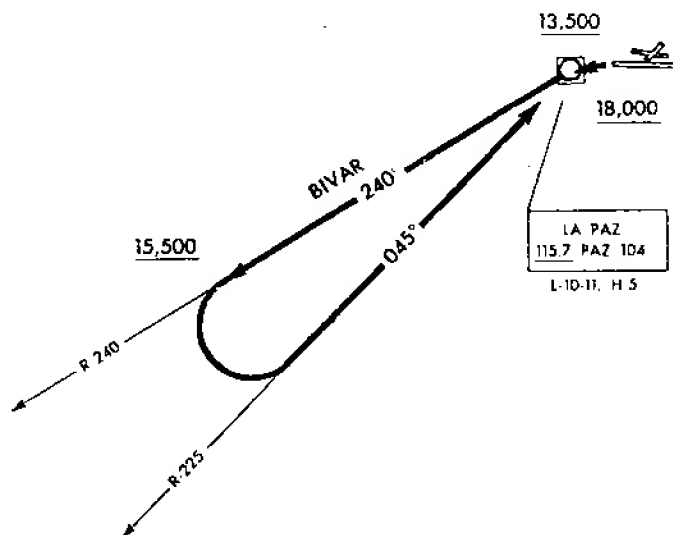
**BIVAR 1 DEPARTURE**

SHL-1982.03

J F KENNEDY INTL  
LA PAZ, BOLIVIA

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000.  
Minimum rate of climb 870 fpm  
to 13,500 at PAZ VOR  
based on 180 KIAS.

**DEPARTURE ROUTE DESCRIPTION**

**TAKE-OFF RWY 27L:** Direct to and cross PAZ VOR/DME at or above 13,500, then via PAZ R-240 until at or above 15,500, left turn to intercept PAZ R-225 to PAZ VOR, cross PAZ VOR at or above 18,000.

**BIVAR 1 DEPARTURE**

145

LA PAZ, BOLIVIA  
J F KENNEDY INTL

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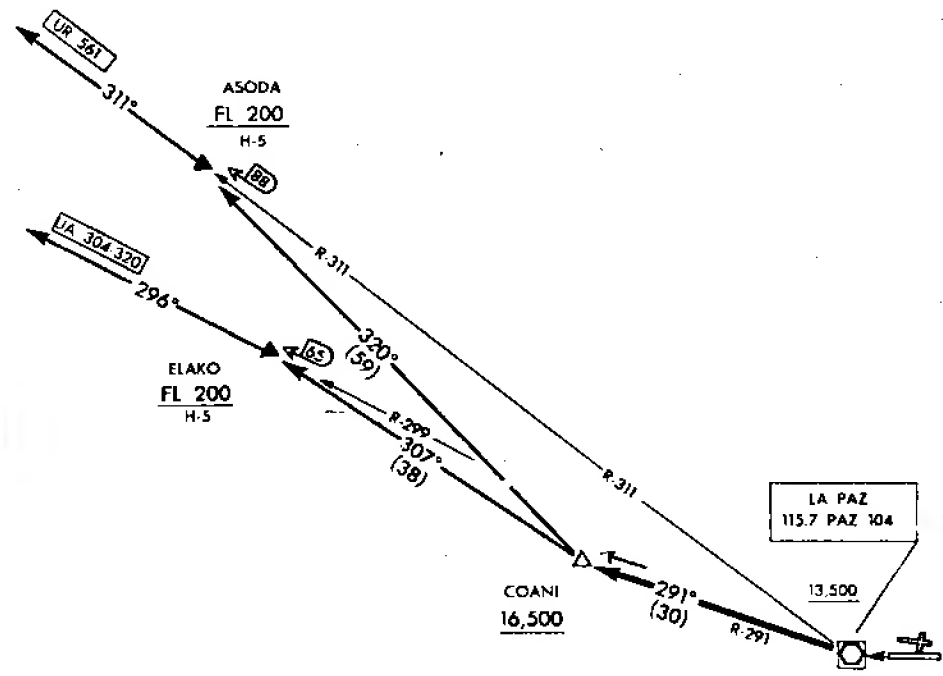


# COANI 1 DEPARTURE

SH-1982.03

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000  
Minimum rate of climb 870 fpm  
based on 180 KIAS



## DEPARTURE ROUTE DESCRIPTION

**TAKE-OFF RWY 27L:** Cross LA PAZ VOR/DME at or above 13,500, intercept PAZ R-291 to cross COANI INT at or above 16,500. Then . . .

. . . For UR561: HDG 320° to cross ASODA INT at or above FL 200.

. . . For UA304-320: HDG 307° to cross ELAKO INT at or above FL 200.





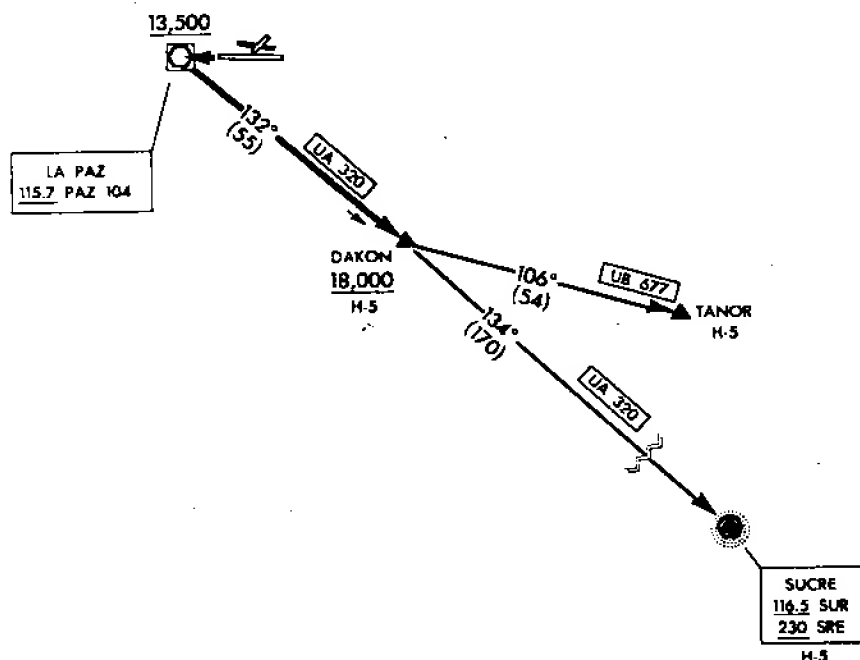
# DAKON 1 DEPARTURE

SH-1982.01

J F KENNEDY INTL  
LA PAZ, BOLIVIA

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000.  
Minimum rate of climb 870 fpm  
to 13,500 at PAZ VOR  
based on 180 KTAS.



## DEPARTURE ROUTE DESCRIPTION

TAKE-OFF RWY 27L: Direct to and cross PAZ VOR/DME at or above 13,500, intercept PAZ R-132 to cross DAKON INT at or above 18,000. Then . . . .

FOR UB 677: Heading 106° to TANOR INT.

FOR UA 320: SUR R-314 to SUR VOR.

# DAKON 1 DEPARTURE

147

LA PAZ, BOLIVIA  
J F KENNEDY INTL



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148

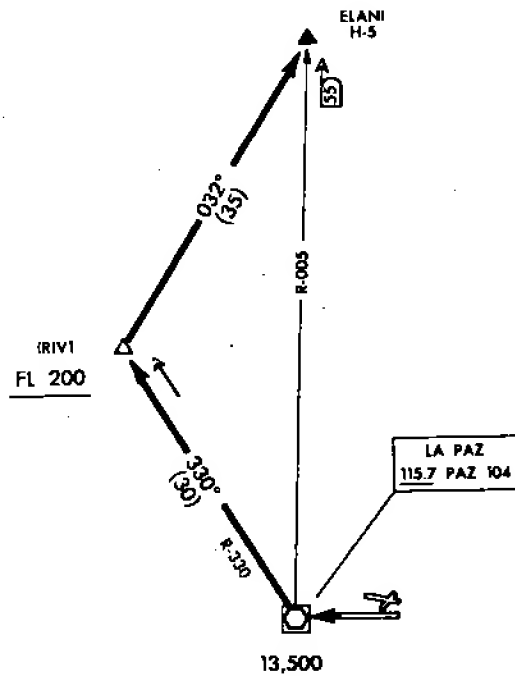
J.F. KENNEDY INTL  
LA PAZ, BOLIVIA

## IRIVI 1 DEPARTURE

SH-1982.04

LA PAZ GND CON  
121.9  
LA PAZ TOWER  
118.3  
LA PAZ APP CON  
119.5

Use 29.92 above 18,000.  
Minimum rate of climb 870 fpm  
based on 180 KIAS.



## DEPARTURE ROUTE DESCRIPTION

TAKE-OFF RWY 27L: Direct to and cross PAZ VOR/DME at or above 13,500, intercept PAZ R-330 to cross IRIVI INT at or above FL 200, then turn right heading 032° to ELANI INT.

IRIVI 1 DEPARTURE

148

LA PAZ, BOLIVIA  
J.F. KENNEDY INTL

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ATTACHMENT # 11

DOD  
FLIGHT INFORMATION PUBLICATION  
(ENROUTE)

## SUPPLEMENT CARIBBEAN AND SOUTH AMERICA

This Supplement is issued EVERY EIGHT WEEKS

**EFFECTIVE 20 DEC 1984**

**TO 14 FEB 1985**

Consult NOTAM and UCN for latest information

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### AIRPORT/FACILITY DIRECTORY LEGEND A-13

**37 ILS/RADAR** - grouping shall consist of the availability of ILS, LOC, LDA, SDF, and RADAR. Pertinent remarks will be shown with the appropriate entry.

- a. Instrument Landing System (ILS) used in an approved DOD instrument approach procedure is indicated by the letters "ILS".
- b. ILS not used in an approved DOD instrument approach procedure is indicated by an arrowhead (◄) preceding the letters "ILS" followed by the appropriate data.

NOTE: Glide slope frequency is not shown when paired with localizer.

- c. Airport Surveillance RADAR (ASR) and/or Precision Approach RADAR (PAR) with DOD approved minima is shown by the statement "RADAR - SEE TERMINAL FLIP FOR RADAR MINIMA".

- d. Stations with no approved DOD minima are shown by a ◄ preceding the word "RADAR".

- e. Installations where EF/SF capability does not exist, or where EF/SF equipment has not passed an official flight check, will be indicated by the "EF/SF svc not avail" or "EF and ck only out flt ck".

**J. F. KENNEDY INTL.** (LA PAZ) 01 0 5LLP CIV/MIL 16°30.6'S 68°11.4'W 13.313  
GMT-4 H-80, L-104-11C

RWY-04 (3907x402 GRAVEL ST155) RWY-22

RWY-08L (6999x394 GRAVEL ST155) RWY-27R

RWY-08R (6,788x10 (13,123x130 CON 584 TT293) 16,10 RWY-27L

SERVICE - AOE L&T - VASI RWY 04R GS-2.5' FUEL - (NC-80, 100, A)

REMARKS - CAUTION - 6' to 8' drop off aprn and Rwy 27L. MISC - Wx

COMMUNICATIONS - LA PAZ NDB - 5469 6638 6649 6659 8835 10024 10096 LA PAZ

APP CON - (O/S UFN) 119.3 LA PAZ TWR - 118.3 LA PAZ GND CON - 121.9

NAVAIDS - LA PAZ VOR-DME - (H) 115.7 PAZ CH 104 16°30.5'S 68°13.9'W 091 1.3 NM to

FLD 1°26'W DME O/S UFN LA PAZ NDB - (230 NM-W) 330 LPZ 16°29.7'S 68°10.9'W A1

FLD 1°28.7'W LA PAZ NDB - (25 NM-W) 330 R 16°30.5'S 68°13.7'W A1 FLD 1°26.6'W

ILS/RADAR - ILS DME - 09R

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ATTACHMENT #12

E4980 1727 260 AASANA-ATC-003	<del>44</del> 0020	<del>1727</del> 0020	<del>250</del> 250 1500	SCDS 00320 5000 1183-2000 AERFA-0001 R	21800
E4980 1727 260 AASANA-ATC-003	<del>33</del> 0011	<del>0020</del> 0011	<del>250</del> 250	SCDS 00320 5000	
E4980 1727 260 AASANA-ATC-003	<del>0018</del> 0018	<del>0020</del> 0018	300	SCDS 00320 5000	
E4980 1727 260 AASANA-ATC-003	<del>0000</del> 0000	<del>0020</del> 0000	300	SCDS 00320 5000	
E4980 1727 260 AASANA-ATC-003	<del>2350</del> 2350	<del>0020</del> 0020	200	SCDS 00320 5000 300 KLA17	118011A

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ATTACHMENT #13

[illegible]



National Transportation  
Safety Board

## Memorandum

Date: November 5, 1985

To: Chairman

Thru: Chief, Denver Field Office *GRB 11-6-85*  
Director, Bureau of Field Operations  
Director, Bureau of Accident Investigation

From: Gregory A. Feith, Air Safety Investigator

Subject: After Action Report - Mount Illimani Expedition

This report is a simplified account of the expedition that took place on Mt. Illimani in Bolivia. It also contains my thoughts about the planning and execution of the expedition.

On September 25, 1985, I was selected to retrieve the cockpit voice recorder and flight data recorder from the Eastern Airlines Boeing 727 that crashed January 1, 1985 at the 19,500 foot level of Mt. Illimani, located near La Paz, Bolivia. I immediately began researching information about high altitude mountain climbing so as to be well informed on the physiological factors associated with the high altitude and lack of oxygen. I contacted Al Errington from Boeing Aircraft Company, and a member of the investigation team, and we discussed the various aspects of the Illimani climb. He informed me that he and Jim Baker, the second Boeing team member, as well as Mark and Allan Gerber, the Airline Pilot's Association investigation team members, were on a prescribed drug called Diamox. The drug Diamox is a potent carbonic anhydrase inhibitor that catalyzes the reversible reaction involving the hydration of carbon dioxide. It is used to reduce the likelihood of edema (which altitude sickness). In addition, Al told me that they were also taking a second drug called Decadron which is an anti inflammatory. I obtained a prescription for Diamox and began taking the drug on October 2. I did not take Decadron. I read a couple of books that discussed the various types of edema and the symptoms associated with each so that I could monitor myself and recognize any abnormalities. I also read several books that described Mt. Illimani and previous climbs (not associated with the accident). I also researched the type of equipment needed for a climb of this calibre and was informed by Mr. Sundeen and Mr. Hendricks, that I had to provide my own equipment and should be self sufficient because equipment and food could not be guaranteed in Bolivia.

I arrived in Washington at NTSB headquarters on Tuesday, October 1, for a planning meeting with the investigation team members, Al Errington and Jim Baker from Boeing, Allan and Mark Gerber and Don McClure from the Airline Pilot's Association, Barry Trotter from Eastern Airlines, John Young and Rudy Kapustin from the NTSB, and Judith Kelly. While I was in Washington I attempted to obtain a cash travel advance of \$2500.00 because I was told that the Bolivian economy was too unstable to use credit cards. I was only able to receive \$600.00 cash because amounts over \$300.00 had to be applied for

several weeks in advance. Unfortunately I only had three working days notice prior to our October 2 departure date. There should be a way of obtaining sufficient travel funds on short notice because credit cards are not always accepted.

The investigation team departed for La Paz on October 2, via Eastern Airlines. The team spent four days in La Paz (12,500 foot elevation) acclimating to the altitude. During the four days, we had several meetings with Royce Fichte, the Consul General in La Paz, our mountain guide Bernardo Guarachi and Renee Quinsanilla, the Red Cross Coordinator in which we discussed the logistics of the climb. As part of our acclimation, we went to Choculiyá, the highest ski area in the world at 16,500 feet. We climbed the slope to the summit which is at 17,400 feet. Everyone in the team completed the climb with no ill effects. The team was in good physical condition on Monday, October 7, when we departed La Paz. We were transported by a small bus called a Micro to the base camp at Mt. Illimani; we drove approximately 65 miles in 4.5 hours.

We began the climb on Tuesday, October 8, at 0800. The first leg of the climb was done on shale rock and snow that had a vertical slope of 10 to 35 degrees. We ascended 3300 feet to our first base camp located at the 17,800 foot level, arriving at approximately 1600. When we arrived at the camp, we were surprised to find none of our equipment that the Red Cross and porters had carried up the mountain for us. After some discussions between Royce Fichte and Renee Quinsanilla via two-way radio, we learned that the equipment had been moved up to our second base camp at 19,500 because it was thought by Renee that we were capable of a 5000 foot ascent the first day. During this portion of the climb, Jim Baker had developed a severe cough which was thought to be a result of the very dry air. Renee was requested by Royce to bring tents and cooking supplies down to our camp because we were not able to continue the ascent. After approximately 2 hours of waiting, several Red Cross people arrived with two tents but no stoves or fuel. Because of darkness, it was not possible to retrieve any further equipment and with the equipment we had available we were able to melt enough snow to make one pot of cold noodle soup that allowed each of us one cup. The two tents that had been brought down were two-man tents, there were seven men. Al Errington, Jim Baker, and Bernardo Guarachi agreed to bivouac which allowed myself, Allan and Mark Gerber, and Royce Fichte to share the tents. At about 0130, Jim woke us and told us that Al Errington had developed signs of pulmonary edema and that he was on oxygen. Jim said that he would monitor Al and if his condition became worse they would attempt to return to the low base camp that night. As it turned out, Al held his own through the night and at 0630 Jim and Al left the team and returned to base camp.

The remaining team members, with the aid of several porters to carry our equipment, completed the second leg of the climb to our base camp at 19,500 feet. This portion was done on a snow slope that ranged from 25 degrees to 45 degrees. During this portion of the climb, we encountered only one problem. Royce had a crampon (spikes used for walking on ice) come off which caused him to lose his balance and fall over the side of the hill that we were climbing. We retrieved Royce, fixed his crampon and continued the climb, arriving at the base camp shortly after noon. The decision was made to remain at this base

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camp the remainder of Wednesday and Thursday so that the team could be well rested and fed before the final leg of the climb which would be the most difficult. In addition, we also used the extra day to allow some of our equipment that would be needed at the accident site to be brought up from the low base camp.

We began the final leg of the ascent on Friday morning at 0915. This part of the climb was done on a snow and ice slope ranging from 20 degrees to 60 degrees vertical. We encountered extremes in weather conditions, i.e., starting with a bright sunny day and warm surface temperatures, changing then to overcast, cold, blizzard conditions, then back to warm temperatures. The weather was constantly changing. We had two slight problems during this ascent, first, Royce fell into a crevasse while attempting to cross an ice bridge over it; second, I had a crampon come off while walking along an ice ledge which eventually collapsed due to the weight of me and my back pack. I had to leave my pack behind so as to complete that portion of the climb. We reached the accident site base camp at 1730, 8.5 hours after starting. During this portion of the climb, Mark Gerber began showing signs of pulmonary edema. His condition deteriorated during the evening and he was sick throughout the night. Saturday morning Mark's condition had deteriorated to the point that his balance and equilibrium was significantly effected and his thought process and speech was slow and inconsistent.

At approximately 0800, we began the process of locating and digging up wreckage in an effort to locate the cockpit voice recorder and flight data recorder. The aircraft wreckage was covered by snow ranging in depth from 5 to 12 feet. We used light weight aluminum grain shovels to move the snow.

The following portions of the aircraft were located and uncovered for examination:

- 1) An eight foot by five foot section of the left forward upper fuselage skin and window frame. The fuselage skin had a part of Eastern's logo painted on it. This part of the aircraft was buried to a depth of approximately five feet.
- 2) The vertical stabilizer with the upper and lower rudder, the "bullet" and a portion of the left horizontal stabilator was uncovered. A hole of approximately ten feet had been dug to reveal the lower portion of the vertical stabilizer. No. 2 engine compartment components were located as well as passenger cabin, galley and lavatory items. Various paperwork from the cockpit was also found in this hole. No evidence of the CVR or FDR was found.
- 3) Small incidental pieces of wreckage were found in a crevasse that runs through the wreckage path. I identified a deflated life vest, a part of a seat back, electrical wiring, and plastic pieces that looked like the overhead storage bin in the passenger cabin. I recovered a set of shoulder harness that was attached to a cockpit flight crew seat. The metal buckles had what appeared to be blood stains on them.

4) A section of the fuselage that I identified as the aft air stair area where the FDR and CVR would be mounted. This section measured approximately four feet by five feet and was covered by approximately seven feet of snow. Again, no evidence of the FDR or CVR.

5) In an area adjacent to the fuselage section described in No.4, a portion of the fuselage was found that measured approximately ten feet long and five feet wide and covered by seven to eight feet of snow. A portion of this fuselage section was uncovered and several lizard skins that were being carried on the aircraft were found frozen to the metal. This section of fuselage appeared to be a portion of lower fuselage skin possibly near a cargo door.

6) There were numerous minute and undescrivable pieces of aircraft wreckage uncovered, none of which could be readily identified or used to find the FDR or CVR.

At 1830, the digging efforts were terminated because of adverse weather and darkness. In addition, I discussed with Royce Fichte the health of the team members and because of my concern for Mark Gerber's, as well as Royce's poor physical condition, I decided to terminate the on-scene investigation and begin the descent as soon as possible. Mark and Royce both used oxygen periodically throughout Saturday evening.

We started the descent on Sunday morning. We were planning to complete the descent in two days but again the Red Cross changed plans without consulting us or even telling us. I was able to complete the descent in one day. Royce also completed the descent in one day with only minor problems. Mark became temporarily incapacitated by the edema and had to be carried down the upper part of the mountain. It took nine hours to transport Mark down to the 17,800 foot base camp. It was decided that Mark, Allan, and Bernardo would spend the night at the base camp and complete the descent on Monday. Again, communication with the Red Cross seemed to lose something in the translation because when it was decided that part of the team was staying on the mountain, the Red Cross was requested to shuttle equipment (fuel for stoves and food) up from the low base camp to the camp at 17,800 feet. The Red Cross people arrived at the camp with two gallons of Kool Aid and extra clothing. Mark, Allan, and Bernardo were able to make due with what they had which got them through the night.

Mark, Allan, and Bernardo arrived at the low base camp at 1400 on Monday. Mark had recovered slightly from the edema and was able to complete the descent under his own power with help from Allan and Bernardo. The entire team, with the exception of Jim Baker, who was admitted earlier in the week to the hospital in La Paz with a lung infection and blood clots, returned to La Paz Monday evening to recover and deacclimate.

The only health related problem that I experienced occurred after I returned to La Paz and the States. I had problems with hyperventilation and low blood pressure which have since returned to normal.

On Thursday, October 17, myself, Mark and Allan Garber departed La Paz for our home bases in the States. Al Errington remained in La Paz with Jim Baker who was still in the hospital recovering. They both returned to Seattle on October 26.

In retrospect of the Illimani expedition, and because an expedition such as this is a possibility in the future, I feel that the Board should be aware of the problems that we encountered, so that future missions will not be hampered by these same problems.

[Portions of page 5 and 6 of the attached report have been deleted.

This information represents the personal views of the investigator and his conclusions and recommendations to the Safety Board with respect to the conduct of high altitude accident investigations under hazardous conditions]

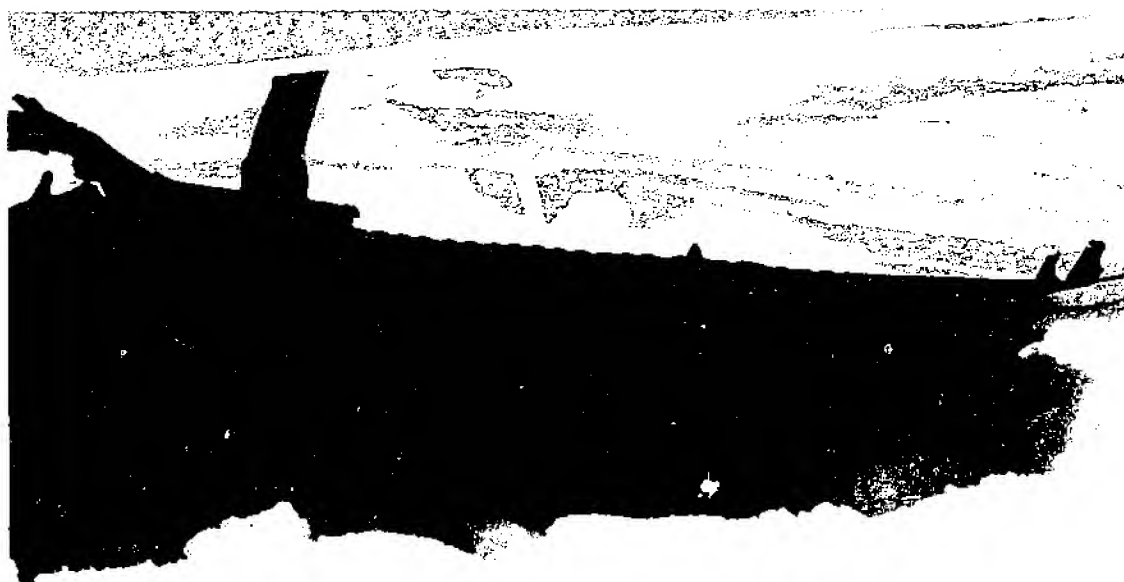
[Portions of page 5 and 6 of the attached report have been deleted. This information represents the personal views of the investigator and his conclusions and recommendations to the Safety Board with respect to the conduct of high altitude accident investigations under hazardous conditions]

I would also like to express my thanks to the Chairman, the Managing Director, the Directors of the Bureau of Accident Investigation and the Bureau of Field Operations for selecting me for the mission and providing me with essential logistical support while I was in Bolivia.

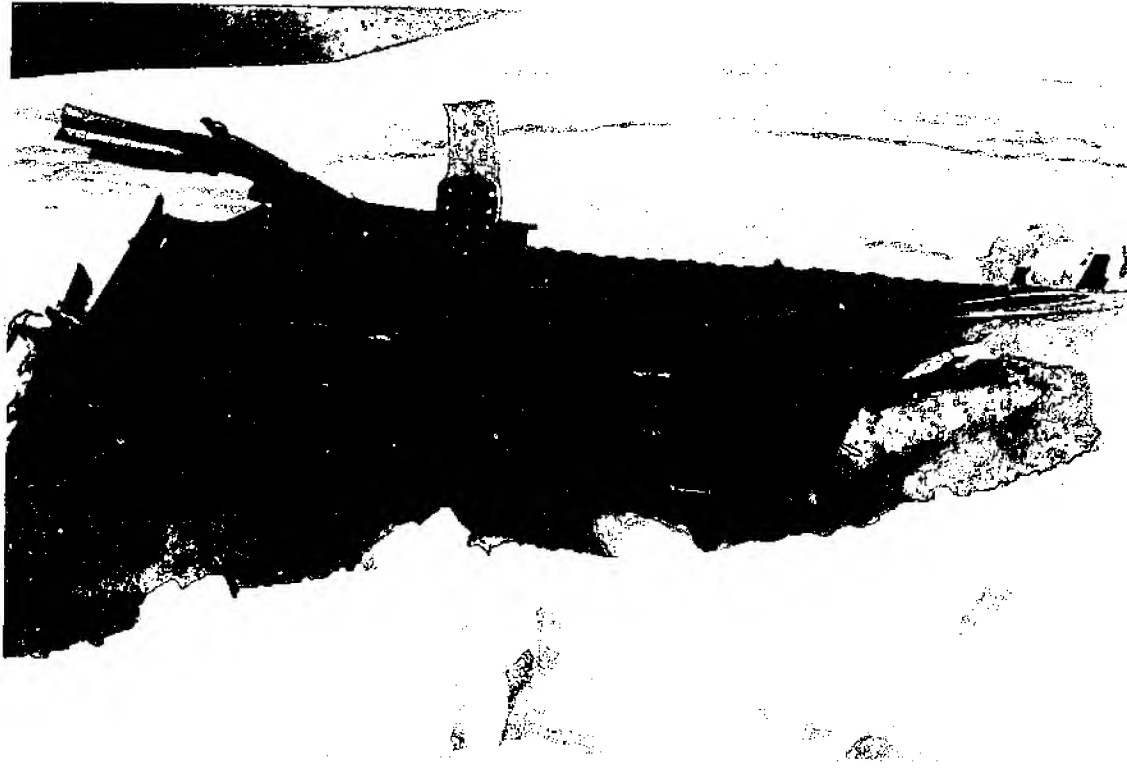
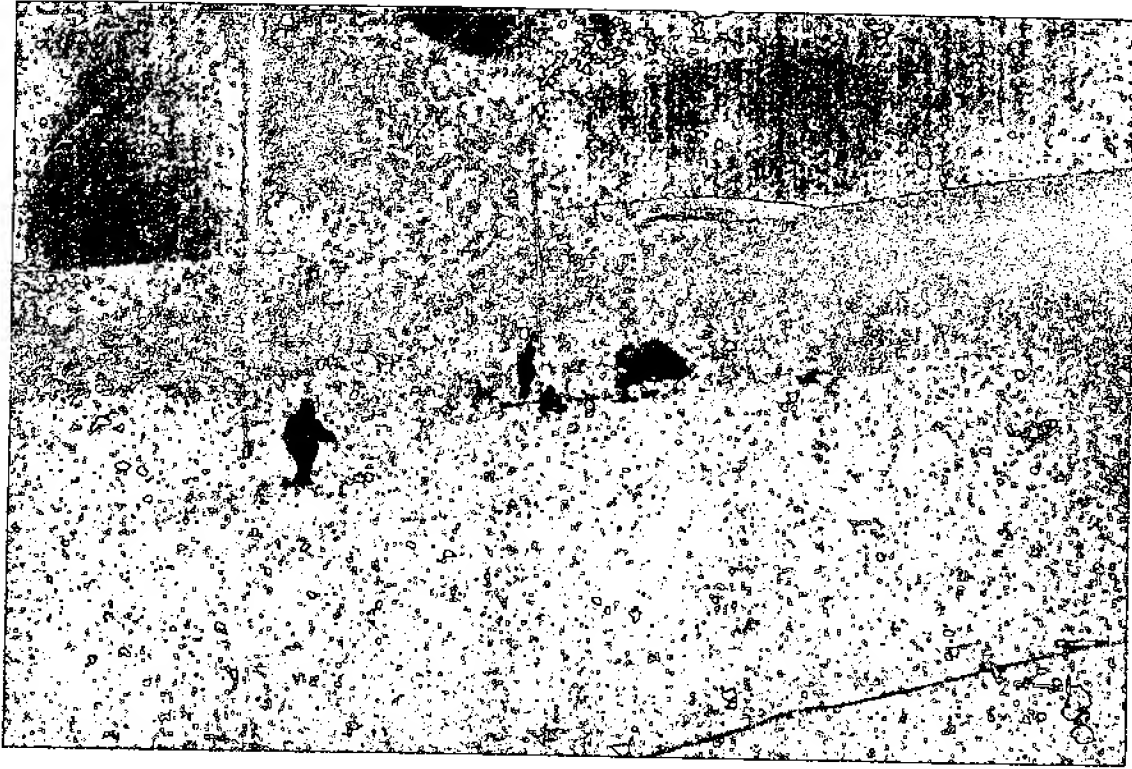


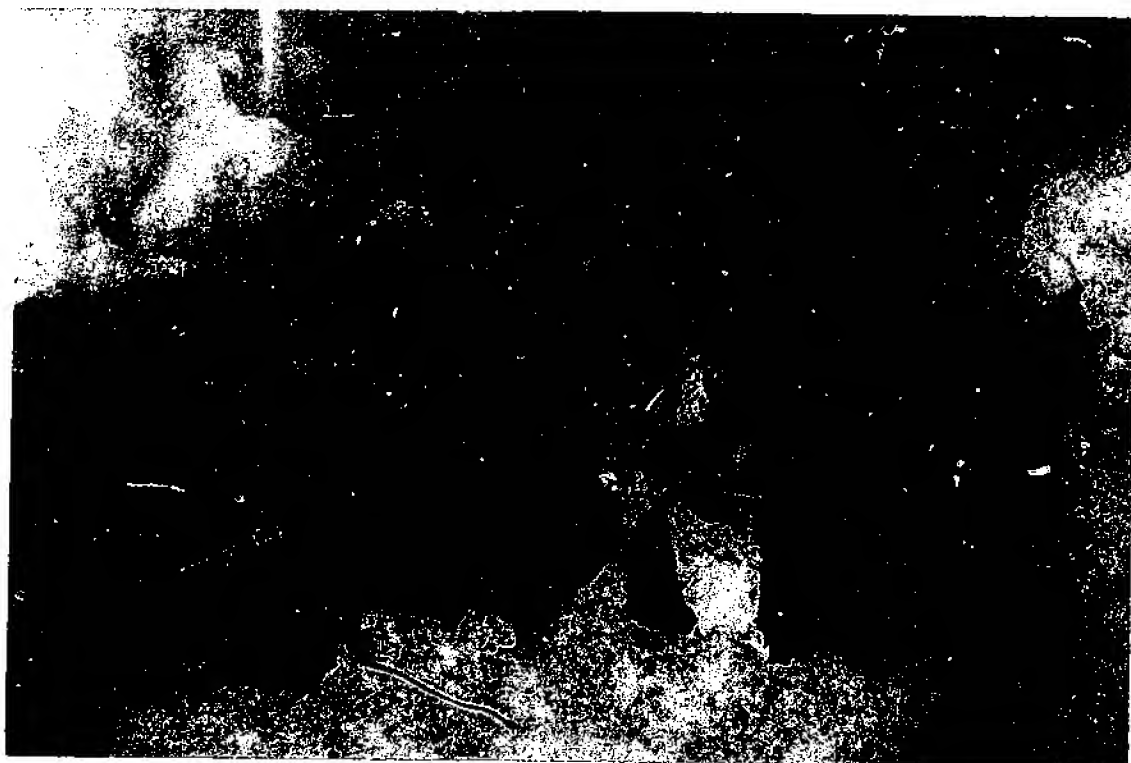
Gregory A. Feith

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DEPARTMENT OF STATE  
DIVISION OF LANGUAGE SERVICES

(TRANSLATION)

LS NO. 118870-A  
RHC/JF  
Spanish

Republic of Bolivia  
Ministry of Aeronautics

No. 004/0009/86-OPS

La Paz, January 2, 1986

Mr. Walter West  
Counselor for Economic and Commercial Affairs  
United States Embassy  
La Paz

Dear Mr. West:

I am replying to the request from the National Transportation Safety Board which you forwarded to our ministry.

I am happy to send you the final report prepared by the Comision Investigadora de Accidentes e Incidentes de Aviacion [Board of Inquiry on Aviation Accidents and Incidents] of the Direccion General de Aeronautica Civil [Civil Aeronautics Bureau] concerning the accident involving the Eastern Airlines Boeing 727-200, Registration No. N-819 EA, together with the NTSB report on the accident.

I also wish to inform you that the Direccion General de Aeronautica Civil, exercising its prerogatives, authorizes the National Transportation Safety Board to publish the NTSB report

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together with the report prepared by the competent Bolivian authority, noting the fact that, since the CVR and FDR could not be recovered because of bad weather conditions and the inaccessibility of the terrain, the conclusions of this report have not been fully confirmed.

Yours truly,

[Signature]

Captain Walter Ballivian C.  
Director of Civil Aeronautics

[D.G.A.C. stamp]

UHC/ob

Cc. SAC  
General Secretariat  
Files

Republic of Bolivia  
Ministry of Aeronautics

REPORT

To: Director General of Civil Aeronautics

From: Comision Investigadora de Accidentes e Incidentes  
de Aviacion

Ref.: Accident involving Boeing 727-200, Registration  
No. N-819 EA, class International Air Carrier of  
passengers, mail, and cargo, owned by Eastern  
Airlines, Inc., which occurred on January ~~12~~<sup>1</sup>,  
1985, on Mount Illimani (Eastern Cordillera of  
the Andes), Murillo Province, Department of La  
Paz.

The investigation in the field was not conducted  
because of the topography of the terrain and  
insufficient resources.

I. The Facts

1.1 Description of the Flight

The Boeing 727-200, Registration No. N-819EA,  
with flight plan Asuncion, Paraguay (SGAS), La Paz, Bolivia  
(SILP), took off at 2257 hours GMT (1857 local time), carrying  
10 crew members, 19 passengers, and 9,815 lb. of cargo.

The translated transcription of the magnetic  
tapes from the Santa Cruz and La Paz control centers,

B-2

reproduced from the ESELA notification point, FIR Bolivia limit, reads as follows:

Part One: Santa Cruz Control, flight 980,  
route UA-320, frequency 123.7 MHz

Time: 2346 hours GMT (1946 hours local time)

EA980: Santa Cruz radio, this is EA980, flight level 350 approaching ESELA.

Control: EA980 confirm your estimate to CAMIRI point.

EA980: Yes, we should be passing ESELA 50, flight level 350.

Control: Understand your estimate ESELA 50, flight level 350, is that correct?

EA980: Yes, that is correct, and our next point will be CAMIRI 0002.

Control: Understand your estimate to CAMIRI point 0002, is that correct?

EA980: Yes, that is correct.

Control: Roger EA980, report point ESELA on this frequency.

EA980: Roger, thank you.

Time: 2350 hours GMT (1950 hours local time)

EA980: EA980 passing ESELA at 50 estimating CAMIRI 02 flight level 350.

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Control: Roger EA980, ESELA 50, CAMIRI 02, report CAMIRI point on this frequency.

EA980: Roger, EA980.

Time: 0001 hours GMT (2001 hours local time)

EA980: EA980 position.

Control: EA980 Santa Cruz, go ahead.

EA980: EA980 over CAMIRI on the hour, flight level 350, estimate SUCRE at 15 past the hour, next is DAKON.

Control: EA980 estimating position SUCRE at 15 past, report SUCRE on this frequency.

EA980: Roger, EA980.

Time: 0005 hours GMT (2005 hours local time)

Control: EA980, Santa Cruz.

EA980: EA980, go ahead.

Control: OK, EA980, the Santa Cruz controllers wish you a Happy New Year, and also your crew and airline. Over.

EA980: OK, thank you, and Happy New Year to you.

Control: Thank you...(illegible)...Santa Cruz.

EA980: Good-bye.

Control: We hope that some day Eastern will fly into Santa Cruz.

EA980: We really hope...(illegible).

Control: Illegible

EA980: I believe so, we can hope.

Time: 0015 hours GMT (2015 hours local time)

EA980: Santa Cruz radio, EA980 position.

Control: EA980, go ahead.

EA980: OK, EA980 over SUCRE at 15, maintaining flight level 350, estimating DAKON at 37, next La Paz.

Control: Roger SUCRE 15, 350, DAKON 37, contact DAKON frequency 123.9. Over.

EA980: 123.9, thank you and happy new year.

Part Two: La Paz Control, TMA SILP, frequency 123.9 MHz

Time: 0025 hours GMT (2025 hours local time)

EA980: La Paz control, EA980. Over.

Control: EA980 go ahead.

EA980: EA980 estimating DAKON 37, maintaining flight level 350, we want to start our descent.

Control: La Paz, roger EA980, authorized VOR La Paz, no anticipated delay, descend and maintain flight level 250. For your information, weather forecast La Paz 080/12 unlimited, 3SC500 iCB750 - 3AS2400 - 07/04 QNH millibars 1034 inches 30/53. Cumulonimbus SE of airfield. Report leaving flight level 350, and report DAKON position. Over.

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Time: 0026 hours GMT (2026 hours local time)

EA980: OK, EA980 leaving flight level 350 for 250 at this time. We will call at DAKON,

Control: La Paz, roger, EA980 leaving 350, report DAKON, over.

EA980: Roger.

Time: 0037 hours GMT (2037 hours local time)

EA980: La Paz control, EA980 DAKON now.

Control: Roger EA980 report which level you are leaving.

EA980: We are holding 250.

Control: Roger, authorized to descend 18,000, report leaving 250.

EA980: OK EA980.

Time: 0038 hours GMT (2038 hours local time)

EA980: La Paz, EA980 leaving flight level 250 for 18,000 at this time.

Control: Roger, EA980, report 20 miles outside.

After this transmission the aircraft was to call on the tower frequency (118.3) at the estimated time of arrival (ETA: 0047 hours GMT), but there was no further radio communication with the aircraft.

Time: 0051 hours GMT (2051 hours local time)

The Air Control Center (ACC), after contact with the stations at Arica (the alternative airport for flight 980), Lima, Antofagasta, and Santa Cruz, attempted to establish communication with the aircraft on frequencies 123.9 and 118.3 MHz, together with Eastern airline agents who were waiting for the flight, but without success.

Time: 0228 hours GMT (2228 hours local time)

The aircraft was declared in the DETRESFA phase, and the appropriate coordination with the specialized agencies of the Bolivian Air Force for the SAR operation was begun. The SAR operation could not be conducted until January 3, 1985, because of bad weather conditions in the probable area of the crash. On that date some parts of the aircraft were found on the southern slope of Mount Illimani, at 19,600 feet, but unfortunately, no survivors were found.

According to the statements by the group of mountain climbers reached the site of the crash, the aircraft had disintegrated, presumably because of a violent impact and subsequent explosion. It was not possible to retrieve the remains of the crew and the passengers, because no corpses could be found, nor were there any bloodstains or other evidence within a radius of approximately 600 meters of the site of the crash.

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The accident occurred at night at 0040 hours GMT (2040 hours local time).

#### 1.2 Personal Injuries

Injuries	Crew	Passengers	Others
Fatal	10	19	-
Serious	-	-	-
Light/Unhurt	-	-	-

#### 1.3 Damage to Aircraft

Because of the violent impact on the rocky ice cap on the southern slope of Mount Illimani, and the characteristics of the aircraft (pressurized altimatica cabin, etc.) it has probably disintegrated.

#### 1.4 Other Injuries

There were no injuries to third parties.

#### 1.5 Information on Crew

Name of Pilot:	Lawrence T. Campbell
Date of Birth:	August 28, 1935
Type of License:	FAA 1461240 - Type AT
Issuance Date:	No reference

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Authorized for: B-727, DC-9. L-11 F/C  
Medical Exam: December 3, 1984  
Valid until: April 30, 1985  
Model Experience: 4,725 hours  
Total Experience: 14,436 hours.

Name of 1st Officer: Kenneth R. Rhodes  
Date of Birth: January 25, 1942  
Type of License: FAA 1576309 - Type CO  
Issuance Date: No reference  
Authorized for: B-727 F/S/O L-188 F/O  
Medical Exam: September 24, 1984  
Valid until: September 30, 1985  
Model Experience: 2,247 hours  
Total Experience: 5,941 hours.

Name of Systems Opr.: Mark L. Bird  
Date of Birth: November 24, 1953  
Type of License: FAA 2131151 - Type CO  
and FE  
Issuance Date: No reference  
Authorized for: No reference  
Medical Exam: August 31, 1984  
Valid until: August 31, 1985

Model Experience: 55:44 hours  
 Total Experience: 55:44 hours.

Check-in Captain: Joseph B. Loseth, Jr.  
 Purser: Haywood Hargrove, Jr.  
 Flight Attendants: Pablo Adler  
 Pablo Letelier  
 Marilyn McQueen  
 Roberto O'Brian  
 Paulina Valenzuela

#### 1.6 Information Concerning the Aircraft

The Boeing 727-200, registration No. N-819FA, is a Scheduled International Carrier of passengers, mail, and cargo, owned by Connecticut National Bank, and operated by Eastern Airlines Inc.

According to the information furnished by the Eastern regional office in La Paz, the last major inspection of the aircraft occurred on December 20, 1984.

#### Aircraft Data:

Aircraft: Boeing 727

<u>Model</u>	<u>Serial No.</u>	<u>Total Time</u>
B-727-225A	22556	8,613 hours

Jet Engines: Pratt and Whitney

(1)	JT8D-17R	707255	99:00
(2)	JT8D-17R	707256	99:00
(3)	JT80-17R	707261	99:00

1.7 Weather Information

Hourly meteorological data for the date of the accident are enclosed (Annex No. 2);

1.8 Communications

In both directions from DAKON notification point (geographical coordinates: 17 degrees, 07.1' South and 67 degrees, 31.0' West (Annex No. 1).

1.9 Airport Information

Not applicable.

1.10 Information on the Remains of the Aircraft and the Crash

Because of the violent impact against the rocky icy surface of Mount Illimani and the technical characteristics (pressurized cabin, altimatica, etc.) the aircraft disintegrated completely.

1.11 Fire

After the first and sole impact, there was probably an explosion and fire, which consumed the few remains of the aircraft.

II. Analysis

The pilot Laurence T. Campbell, First Officer Kenneth R. Rhodes, and Systems Operator Mark L. Bird were found to be duly licensed for that type of aircraft and in possession of valid medical certificates, as were the flight attendants: Haywood Hargrove, Jr., Paul Adler, Pablo Letelier, Marilyn McQueen, Roberto O'Brian, and Paulina Valenzuela.

The Boeing 727-200, registration No. N-819EA, was inspected on December 20, 1984, as the Manager of Flight Operations and Maintenance for Eastern Air Lines Inc. noted in his report.

According to the transcript of the tape from the Santa Cruz and La Paz Control Centers, the aircraft was in a normal flight pattern and reporting from the points specified in its flight plan. The aircraft reached DAKON point, which was reported at 0037 hours GMT (2037 hours local time); one minute later the pilot of the aircraft reported that he was leaving FL250 for 18,000 feet.

After this communication, the radio signals stopped completely, and all attempts to reestablish contact with flight 980 failed.

At 0228 hours GMT (2228 hours local time), the aircraft was declared in the DETRESFA phase, and the appropriate coordination was initiated with the specialized agencies of the Bolivian Air Force for the SAR (Search and Rescue) operation, which were responsible for this operation on direct instructions from the Minister of Aeronautics.

The wreckage of the aircraft was found on January 3, 1985, on the southern slope of Mount Illimani, on radial 109° (VOR)/La Paz at 26 MN at an altitude of 19,600 feet.

An analysis of the crash site and the last point reported by the aircraft (DAKON) established that for reasons unknown, the aircraft had deviated 26 degrees to the right of the scheduled airway (UA-320).

With the cooperation of experts on B-727 equipment and on Omega navigation (from LAB (Bolivian Air Lines)), the following possible causes of the deviation were analyzed.

1. Involuntary deviation from the estimated course of the aircraft.
2. Adverse weather conditions affecting the estimated course of the aircraft.
3. Confusion in introducing the coordinates into the Omega navigation system of the aircraft.

### III. Conclusions

The Comision Investigadora, on the basis of the previous analysis and the report by the National Transportation Safety Board, concluded that the accident was

apparently caused by the aircraft's deviation from its airway, possibly because of operational failure, aggravated by bad weather conditions at the site.

Because of the bad weather conditions and the inaccessibility of the terrain it was not possible to reach the site of the crash or to recover the CVR and FDR, which imposed limitations on an exact evaluation of this accident.

IV. The Comision Investigadora de Accidentes e Incidentes de Aviacion suggests the following:

One: It recommends that all crews assigned to International Air Carriers operating in the cordillera areas and especially at El Alto International Airport should be properly trained and licensed for this type of operation.

Two: It recommends that, when the weather is bad at the terminal areas and en route, Bolivian and foreign airlines and operators should request information and advice from the appropriate offices of the Servicio de Transito Aereo [Air Travel Office] (ACC La Paz, Santa Cruz), following international rules and recommendations as published in AIP-Bolivia.

Three: It recommends that the operability of aids to air navigation be checked periodically according to existing regulations.

Four: It recommends that a map of the area be prepared (to supplement the existing ones in AIP-Bolivia), which would include the most prominent obstacles, duly indicated.

We submit this report to you for your consideration.

La Paz, September 4, 1985.

OPS.

COM. pa.

cc. FAB [Bolivian Air Force]  
LAB [Bolivian Air Lines]  
AASANA  
N.T.S.B.

Captain Humberto Da Dalti  
Chief, Department of Operations, DGAC

[Signature]

[Signature]

Dr. Freddy Rojas	Mr. Gerardo Lederma	Mr. Gaston Rivera
DGAC Legal Adviser	Dept. Aeronavegabilidad	Dept. Seguridad Aerea
	[Airworthiness Dept.]	[Air Safety Dept.]

[Signature]

Mr. Victor Hugo Cabrera	Lt. Oscar Vargas	Mr. Eduardo Reyes
Div. Verificacion OPS	F.A.B.	ACC Chief La Paz
<u>Vuelo</u>		
[OPS Flight Control Div.]		

Commander German Rosas	Captain Mario Borda	Mr. Rodolfo Beltran
L.A.B.	L.A.B.	AASANA

[Signature]

Sub. Of. Alvarez	Jorge Zurita R.
F.A.B.	Div. Accid. e Incid. OPS
	[Accidents and Incidents Div. OPS]

[Signature]

Captain Walter Ballivian Chavez  
Director of Civil Aeronautics





REPUBLICA DE BOLIVIA  
MINISTERIO DE AERONAUTICA

Cite Nº 004/0007/86 - OPS

6 E A I R

La Paz, 2 de Enero de 1986

Señor  
Walter West  
CONSEJERO PARA ASUNTOS ECONOMICOS Y COMERCIALES  
EMBAJADA DE LOS ESTADOS UNIDOS DE AMERICA

Presente

Distinguido Señor:

Tengo el honor de dirigirle la presente a objeto de responder a la solicitud de la "National Transportation Safety Board" (NTSB) que tan gentilmente ha hecho usted llegar a nuestro Ministerio.

A este respecto, me es grato enviarle el informe final evacuado por la Comisión Investigadora de Accidentes e Incidentes de Aviación de esta Dirección General, sobre el accidente de la Aeronave BOEING 727-200 Matrícula N-819 EA de "Eastern Airlines Inc" así como el Informe de la NTSB sobre el mismo.

Por otra parte hago saber a usted, por la presente - que, la Dirección General de Aeronáutica Civil, en uso de sus atribuciones, autoriza a la "National Transportation Safety Board" a publicar el Informe de la NTSB así como el Informe evacuado por la Autoridad competente del Estado Boliviano, haciendo resaltar el hecho de que, por no haberse rescatado los Registradores de voz (CVR) y de vuelo -- (FIR) debido a las condiciones adversas del tiempo y a la inaccesibilidad del terreno, las conclusiones de dicho informe no están confirmadas, plenamente.

Sin otro particular, reitero a usted las seguridades de mi más distinguida consideración.

*Walter Bolivian Chavez*  
Cap. Walter Bolivian Chavez  
Director General de Aeronáutica Civil

VHC/ob  
cc. SAC  
Stria Gral.  
Archivo



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REPUBLICA DE BOLIVIA  
MINISTERIO DE AERONAUTICA

**COPIA**

I N F O R M E

AL: SEÑOR DIRECTOR GENERAL DE AERONAUTICA CIVIL

DE: LA COMISION INVESTIGADORA DE ACCIDENTES E INCIDENTES DE AVIACION.

REF: Accidente de la aeronave Boeing 727-200, matrícula N-819 EA, categoría Transporte Aéreo Internacional de pasajeros, correo y carga, de propiedad de la Empresa Eastern Airlines Inc., ocurrido en fecha 12 de Enero de 1985, en el nevado "Illimani" (Cordillera Oriental de los Andes), Provincia Murillo del Departamento de La Paz,

No se realizó la correspondiente investigación de campo - debido a la topografía del terreno así como a la falta - de medios adecuados.

I.- INFORMACION SOBRE LOS HECHOS

1.1 RESEÑA DEL VUELO

La aeronave Boeing 727-200, matrícula N-819EA, con plan de vuelo Asunción del Paraguay (SGAS) La Paz, Bolivia - (SILP), despegó a hrs. 22:57 GMT (18:57 HOB), llevando a bordo 10 tripulantes, 19 pasajeros y 9815 Lb. de carga.

La transcripción traducida de las cintas magnetofónicas de los Centros de Control de Santa Cruz y La Paz, reproducidas a partir del punto de notificación ESELA, límite FIR Bolivia, es como sigue:

PRIMERA PARTE: Control Santa Cruz y el vuelo V/980, ruta UA-320, frec. 123.7 Mhz.

Hrs. 23:46 GMT (19:46 Hora local)

EA980: Santa Cruz radio EA980 está con Uds. nivel de vuelo 350 aproximándose ESELA.

Control: EA980 confirme su estimado al punto CAMINI

EA980: Si señor pasaríamos ESELA 50 nivel de vuelo 350.

Control: Entiendo su estimado ESELA 50 nivel de vuelo - 350, es correcto?

EA980: Si señor es correcto y nuestro próximo punto es-

AL: SEÑOR DIRECTOR GENERAL DE AERONAUTICA CIVIL

DE: LA COMISION INVESTIGADORA DE ACCIDENTES E INCIDENTES DE AVIACION.

REF: Accidente de la aeronave Boeing 727-200, matrícula N-819 EA, categoría Transporte Aéreo Internacional de pasajeros, correo y carga, de propiedad de la Empresa Eastern Airlines Inc., ocurrido en fecha 12 de Enero de 1985, en el nevado "Illimani" (Cordillera Oriental de los Andes), Provincia Murillo del Departamento de La Paz,

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Hrs. 23:46 GMT (19:46 Hora local)

EA980: Santa Cruz radio EA980 está con Uds. nivel de vuelo 350 aproximándose ESELA.

Control: EA980 confirme su estimado al punto CAMIRI

EA980: Si señor pasaríamos ESELA 50 nivel de vuelo 350.

Control: Entiendo su estimado ESELA 50 nivel de vuelo - 350, es correcto ?

EA980: Si señor es correcto y nuestro próximo punto será CAMIRI 0002.

Control: Entiendo su estimado al punto CAMIRI 0002, es correcto señor?

EA980: Si señor, es correcto

Control: Recibido EA980 reporte el punto ESELA en esta frecuencia.

EA980: Si señor, lo haremos, muchas gracias.

2.////

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Hrs. 23: 50 GMT (19:50 Hora local)

EA980 : EA980 pasando ESCLA a 50 estimando CAMIRI 02  
nivel de vuelo 350.  
Control: Recibido EA980 ESCLA 50 CAMIRI 02 reporte pun-  
to CAMIRI en ésta frecuencia.  
EA980 : Si señor, lo haremos, EA980.

Hrs. 00: 01 GMT (20:01 Hora local)

EA980 : EA980 posición  
Control: EA980 Santa Cruz adelante.  
EA980 : EA980 sobre CAMIRI en la hora, nivel de vuelo  
350, estimando SUCRE a 15 pasando la hora, próxi-  
mo DAKON.  
Control: EA980 estimando posición SUCRE 15, reporte SUCRE  
en ésta frecuencia.  
EA980 : Lo haremos, EA980.

Hrs. 00:05 GMT (20:05 Hora local)

Control : EA980 Santa Cruz  
EA980 : EA980 adelante  
Control : OK EA980, los controladores de Santa Cruz desea-  
mos que pase Ud. venturoso y Próspero Año Nuevo,  
también su tripulación y su Compañía. Cambio.  
EA980 : OK gracias y Feliz Año Nuevo a Ud., señor.  
Control : Gracias..... ..(ilegible).....Santa Cruz.  
EA980 : Hasta luego.  
Control : Esperamos señor que Eastern vuele algún día a -  
Santa Cruz.  
EA980 : Nosotros realmente esperamos.....(ilegible)  
Control : Ilegible.....  
EA980 : Creo en eso, podríamos esperar.

Hrs. 00:15 GMT (20:15 Hora local)

EA980 : Santa Cruz radio EA980 posición  
Control : EA980 adelante  
EA980 : OK señor, EA980 sobre SUCRE a 15 manteniendo ni-  
vel de vuelo 350 estimando DAKON 37, próximo La  
Paz.  
Control : Recibido SUCRE 15, 350, DAKON 37, contacto DAKON  
frecuencia 123.9. Cambio.  
- 2 - muchas gracias y Feliz Año Nuevo

Hrs. 23: 50 GMT (19:50 Hora local)

EA980 : EA980 pasando ESCLA a 50 estimando CAMIRI 02  
nivel de vuelo 350.  
Control: Recibido EA980 ESCLA 50 CAMIRI 02 reporte pun-  
to CAMIRI en esta frecuencia.  
EA980 : Si señor, lo haremos, EA980.

Hrs. 00: 01 GMT (20:01 Hora local)

EA980 : EA980 posición  
Control: EA980 Santa Cruz adelante.  
EA980 : EA980 sobre CAMIRI en la hora, nivel de vuelo  
350, estimando SUCRE a 15 pasando la hora, próxi-  
mo DAKON.  
Control: EA980 estimando posición SUCRE 15, reporte SUCRE  
en esta frecuencia.  
EA980 : Lo haremos, EA980.

Hrs. 00:05 GMT (20:05 Hora local)

Control : EA980 Santa Cruz  
EA980 : EA980 adelante  
Control : OK EA980, los controladores de Santa Cruz desea-  
mos que pase Ud. venturoso y Próspero Año Nuevo,  
también su tripulación y su Compañía. Cambio.  
EA980 : OK gracias y Feliz Año Nuevo a Ud., señor.  
Control : Gracias.....(ilegible).....Santa Cruz.  
EA980 : Hasta luego.  
Control : Esperamos señor que Eastern vuele algún día a -  
Santa Cruz.  
EA980 : Nosotros realmente esperamos.....(ilegible)  
Control : Ilegible.....  
EA980 : Creo en eso, podríamos esperar.

Hrs. 00:15 GMT (20:15 Hora local)

EA980 : Santa Cruz radio EA980 posición  
Control : EA980 adelante  
EA980 : OK señor, EA980 sobre SUCRE a 15 manteniendo ni-  
vel de vuelo 350 estimando DAKON 37, próximo La  
Paz.  
Control : Recibido SUCRE 15, 350, DAKON 37, contacto DAKON  
frecuencia 123.9. Cambio.  
EA980 : 123.9, muchas gracias y Feliz Año Nuevo

SEGUNDA PARTE: Control La Paz, TMA SLLP, frecuencia 123.9 Mhz.

Hrs. 00:25 GMT (20:25 Hora local)

EA980 : La Paz control EA980. Cambio  
Control : EA980 adelante.  
EA980 : EA980 estimando DAKON 37 manteniendo nivel de vue-  
lo 350, desearíamos empezar a descender.  
Control : La Paz recibido EA980 autorizado al VOR La Paz.

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no se prevea demora descienda y mantenga nivel de vuelo 250. Para información pronóstico de tiempo La Paz 080/12 ilimitado 3SC500 1CB750 - 3A92400 - 07/04 QNH milibares 103 1/4 pulgadas 30/53. Cumul Nimbus al SE del Campo, reporte dejando nivel de vuelo 350 y reporte posición DAKON. Cambio.

Hrs. 0026 GMT (20:26 Hora local)

EA980 : OK EA980 dejando nivel de vuelo 350 para 250 en este momento. Llamaremos DAKON.  
Control: La Paz, recibido, EA980 dejando 350, reporte DAKON, Cambio.  
EA980 : Lo haremos.

Hrs. 0037 GMT (20:37 Hora local)

EA980 : La Paz control, EA980 DAKON ahora  
Control: Recibido EA980 informe que nivel está dejando;  
EA980 : Estamos manteniendo 250.  
Control: Recibido, autorizado a descender 18000 informe dejando 250.  
EA980 : OK EA980.

Hrs. 0038 GMT (20:38 Hora local)

EA980 : La Paz EA980 dejando nivel de vuelo 250 para 18000, en este momento.  
Control: Recibido EA980, informe 20 millas fuera.  
Luego de esta transmisión, la aeronave debió llamar en frecuencia torre (118.3 Mhz) a la hora estimada de aproximación (ETA: 00:47 GMT), pero se interrumpieron en forma total las radio-comunicaciones con la misma.

Hrs. 0051 GMT (20:51 Hora local)

El Control de Aproximación (ACC), previo contacto con las estaciones de Arica (Aeropuerto de alternativa del vuelo 980), Lima, Antofagasta y Santa Cruz intentó establecer comunicación con la aeronave en frecuencia 123.9 y 118.3 Mhz, como también, pasajeros de la Empresa que aguardaban el vuelo, sin resultados positivos.

Hrs. 02:28 GMT (22:28 Hora local)

La aeronave es declarada en fase de DETRESYA iniciándose la rescatación con organismos especializados de la Fuerza

no se prevase demora descienda y mantenga nivel de vuelo 250. Para información pronóstico de tiempo La Paz 080/12 ilimitado 3SC500 1CB750 - 3AS2400 - 07/04 QNH milibares 103 $\frac{1}{2}$  pulgadas 30/53. Cumuluniabus al SE del Campo, reporte dejando nivel de vuelo 350 y reporte posición DAKON, Cambio.

Hrs. 00:26 GMT (20:26 Hora local)

EA980 : OK EA980 dejando nivel de vuelo 350 para 250 en este momento. Llamaremos DAKON.  
Control: La Paz, recibido, EA980 dejando 350, reporte DAKON, Cambio.  
EA980 : Lo haremos.

Hrs. 00:37 GMT (20:37 Hora local)

EA980 : La Paz control, EA980 DAKON ahora  
Control: Recibido EA980 informe que nivel está dejando;  
EA980 : Estamos manteniendo 250.  
Control: Recibido, autorizado a descender 18000 informe dejando 250.  
EA980 : OK EA980.

Hrs. 00:38 GMT (20:38 Hora local)

EA980 : La Paz EA980 dejando nivel de vuelo 250 para 18000, en este momento.  
Control: Recibido EA980, informe 20 millas fuera.

Luego de esta transmisión, la aeronave debió llamar en frecuencia torre (118.3 Mhz) a la hora estimada de aproximación (ETA: 00:47 GMT), pero se interrumpieron en forma total las radio-comunicaciones con la misma.

Hrs. 00:51 GMT (20:51 Hora local)

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Hrs. 02:28 GMT (22:28 Hora local)

La aeronave es declarada en fase de DETRUSFA iniciándose la respectiva coordinación con organismos especializados de la Fuerza Aérea Boliviana para la operación SAR. La misma, no se pudo llevar a cabo hasta el 3 de Enero de 1985, debido a las condiciones meteorológicas adversas en la probable zona del siniestro, fecha en la que algunos restos de la aeronave fueron encontrados en la ladera Sud del Nevado "Illimani", a 19.600 pies de altitud, lamentablemente sin sobrevivientes.

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De acuerdo a declaraciones del Grupo de Andinistas que llegaron al lugar del suceso, la aeronave quedó desintegrada, presumiblemente debido al violento impacto y posterior explosión. No fué posible rescatar los restos de la tripulación ni de los pasajeros, pues no se pudo ubicar ningún cuerpo humano, tampoco se encontraron manchas de sangre u otra evidencia, en un área -- aproximada de 600 metros de radio del lugar del impacto.

Este accidente ocurrió en hora nocturna, a horas 00:40 GMT (20:40 hora local).

1.2 LESIONES A PERSONAS

LESIONES	TRIPULANTES	PASAJEROS	OTROS
MORTALES	10	19	-
GRAVES	-	-	-
LEVES/ILESOS	-	-	-

1.3 DAÑOS SUFRIDOS POR LA AERONAVE

Debido al violento impacto sobre la capa de hielo rocoso en la ladera Sur del Nevado Illimani, así como a las características de la aeronave (cabina altimétrica, presurizada, etc.), posiblemente quedó desintegrada.

1.4 OTROS DAÑOS

No hubieron daños a terceros.

1.5 INFORMACION SOBRE EL PERSONAL

Nombre del Piloto : Lawrence T. Campbell  
Fecha de Nacimiento : 28/08/35  
Clase de Licencia : FAA 1461240 - Tipo AT  
Fecha de Otorgación : Sin Ref.  
Habilitaciones : B-727, DC-9, L-11 F/C  
Fecha de Emisión : 03/12/84



De acuerdo a declaraciones del Grupo de Andinistas que llegaron al lugar del suceso, la aeronave quedó desintegrada, presumiblemente debido al violento impacto y posterior explosión. No fué posible rescatar los restos de la tripulación ni de los pasajeros, pues no se pudo ubicar ningún cuerpo humano, tampoco se encontraron manchas de sangre u otra evidencia, en un área — aproximada de 600 metros de radio del lugar del impacto.

Este accidente ocurrió en hora nocturna, a horas 00:40 GMT (20:40 hora local).

1.2 LESIONES A PERSONAS

LESIONES	TRIPULANTES	PASAJEROS	OTROS
MORTALES	10	19	-
GRAVES	-	6	-
LEVES/ILESOS	-	-	-

1.3 DAÑOS SUFRIDOS POR LA AERONAVE

Debido al violento impacto sobre la capa de hielo rocoso en la ladera Sud del Nevado Illimani, así como a las características de la aeronave (cabina altimétrica, presurizada, etc.), posiblemente quedó desintegrada.

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Nombre del Piloto : Lawrence T. Campbell  
 Fecha de Nacimiento : 28/08/35  
 Clase de Licencia : FAA 1461240 - Tipo AT  
 Fecha de Otorgación : Sin Ref.  
 Habilitaciones : B-727, DC-9, L-11 F/C  
 Exámen Médico : 03/12/84  
 Vigencia : 30/04/85  
 Experiencia Tipo : 4.725 hrs.  
 Experiencia Total : 14.436 hrs.

Nombre del 1er. Oficial : Kenneth R. Rhodes  
 Fecha de Nacimiento : 25/01/42

5.//////



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Clase de Licencia : FAA 1576309 - Tipo CO.  
Fecha de Otorgación : Sin Ref.  
Habilitaciones : E-727 F/S/O L-188 F/O  
Exámen Médico : 24/09/84  
Vigencia : 30/09/85  
Experiencia Tipo : 2.247 Hrs.  
Experiencia Total : 5.941 Hrs.

---

Nombre Operador de  
Sistemas : Mark L. Bird  
Fecha de Nacimiento : 24/11/53  
Clase de Licencia : FAA 2131151 - Tipo CO & FE  
Fecha de Otorgación : Sin Ref.  
Habilitaciones : Sin Ref.  
Exámen Médico : 31/04/84  
Vigencia : 31/08/85  
Experiencia Tipo : 55:44 Hrs.  
Experiencia Total : 55:44 Hrs.

---

Cap. Chequador : Joseph H. Loeth, Jr.  
Comisario de Abordo : Haywood Hargrove, Jr.  
Auxiliares de Cabina : Pablo Adler  
Pablo Letelier  
Marilyn Mc. Queen  
Roberto O'Brian  
Paulina Valenzuela

1.6 INFORMACION SOBRE LA AERONAVE

La aeronave Boeing 727-200, matrícula N-819FA, se encuentra inscrita en la categoría Transporte Aéreo Internacional Regular de Pasajeros, correo y carga, de propiedad de Connecticut National Bank y operada por la Empresa Eastern Air Lines Inc.

Clase de Licencia : FAA 1576309 - Tipo CO.  
 Fecha de Otorgación : Sin Ref.  
 Habilitaciones : B-727 F/S/O L-188 F/O  
 Exámen Médico : 24/09/84  
 Vigencia : 30/09/85  
 Experiencia Tipo : 2.247 Hrs.  
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INFORMACION SOBRE LA AERONAVE

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Conforme a información proporcionada por la oficina regional de Eastern en la ciudad de La Paz, se efectuó la última inspección mayor a la aeronave en fecha 20 de Diciembre de 1984.

DATOS DE LA AERONAVE

Nave: Boeing-727

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<u>MODELO</u>	<u>Nº DE SERIE</u>	<u>T. TOTAL</u>
B-727-225A	22556	8.613

Turbinas: Pratt & Whitney

1) JT8D-17R	707255	99:00
2) JT8D-17R	707256	99:00
3) JT8D-17R	707261	99:00

1.7 INFORMACION METEOROLOGICA

Se adjuntan datos meteorológicos horarios, que corresponden a la fecha del accidente (ANEXO Nº 2).

1.8 COMUNICACIONES

En ambos sentidos, hasta el punto de notificación DAKON (Coordenadas geográficas: 17º 07.1' Latitud Sur y 67º 31.0' Longitud Oeste (ANEXO Nº 1).

1.9 INFORMACION DE AERODROMO

No corresponde.

1.10 INFORMACION SOBRE LOS RESTOS DE LA AERONAVE Y EL IMPACTO

Como consecuencia del violento impacto, contra la superficie de hielo rocoso del nevado "Illimani" y a las características técnicas (cabina presurizada, altimétrica, etc.) la aeronave quedó completamente desintegrada.

1.11 INCENDIO

Luego del primer y único impacto, posiblemente se produjo una explosión e incendio, que terminó por consumir los pocos restos de la aeronave.

II.- ANALISIS

El piloto Laurence T. Campbell, el Primer Oficial Kenneth R. Rhodes y el Operador de Sistemas Mark L. Bird, se encontraban debidamente habilitados en el tipo de aeronave y con certificados médicos vigentes, del mismo modo, los

<u>MODELO</u>	<u>Nº DE SERIE</u>	<u>T. TOTAL</u>
B-727-225A	22556	8.613

Turbinas: Pratt & Whitney

1) JT8D-17R	707255	99100
2) JT8D-17R	707256	99100
3) JT8D-17R	707261	99100

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Luego del primer y único impacto, posiblemente se produjo una explosión e incendio, que terminó por consumir los pocos restos de la aeronave.

II.- ANALISIS

El piloto Laurence T. Campbell, el Primer Oficial Kenneth R. Rhodes y el Operador de Sistemas Mark L. Bird, se encontraban debidamente habilitados en el tipo de aeronave y con certificados médicos vigentes, del mismo modo, los auxiliares de cabina, señores: Haywood Hargrove, Jr., Paul Adler, Pablo Letelier, Marilyn Mc. Queen, Roberto O'Brien y Pauline Valenzuela.

La aeronave Boeing 727-200, matrícula N-819EA, fue inspeccionada el 20 de Diciembre de 1984, como anota en su informe el Gerente de Operaciones de Vuelo y Mantenimiento de la Empresa Eastern Air Lines, Inc.

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De acuerdo a la transcripción de la cinta magnetofónica de los Centros de Control de Santa Cruz y La Paz, la aeronave desarrollo el vuelo en forma normal, efectuando el correspondiente reporte sobre los puntos especificados en el plan de vuelo, llegando de éste modo al punto DAKON, el cual fué reportado a hrs. 00:37 GMT (20:37 Hora local) y luego de - un minuto el piloto de la aeronave informó que abandonaba el FL 250 para 18.000 pies.

Con posterioridad a ésta comunicación, se interrumpieron las señales de radio en forma total, resultando inútil todo intento de establecer nueva comunicación con el V/980 EA.

A hrs. 02:28 GMT (22:28 Hora local) la aeronave fué declarada en fase DEPRESFA, iniciándose la respectiva coordinación para la operación SAR (Search and Rescue) con organismos especializados de la FAR, quienes tuvieron a su cargo dicha operación, por instrucciones directas del señor Ministro de Aeronáutica.

La aeronave siniestrada fué localizada el día 3 de Enero de 1985, en la ladera Sud del nevado "Illimani", sobre el radial 108° VOR/La Paz a 26 MN y a una altitud de 19.600 pies.

Analizando el lugar de colisión y el último punto notificado por la aeronave (DAKON), se establece que la misma - sufrió un desvío de 26° a la derecha de la serovia prevista (UA-320), ignorándose la causa que indujo efectúen dicho desvío.

Con la colaboración de expertos en equipo B-727, así como en navegación Omega (de la Empresa LAR) se analizó -- las siguientes posibles causas del desvío.

- 1.- Desvío involuntario del curso estimado de la aeronave.
- 2.- Condiciones meteorológicas adversas sobre el curso estimado de la aeronave.
- 3.- Confusión en la introducción de las coordenadas al sistema de Navegación Omega de la aeronave.

### III.- CONCLUSIONES

La Comisión Investigadora de acuerdo al análisis anterior y en base al Informe de la "National Transport Safety Board" (NTSB), concluye que el accidente se debió osten-

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### III.- CONCLUSIONES

La Comisión Investigadora de acuerdo al análisis anterior y en base al Informe de la "National Transport Safety -- Board" (NTSB), concluye que el accidente se debió ostensiblemente al desvío fuera de aerovía de la aeronave, no-siblemente por falla operacional y agravada por las condiciones meteorológicas adversas en el lugar del hecho.

Debido a las condiciones adversas del tiempo, así como a la inaccesibilidad del terreno no se llegó al lugar del suceso, como tampoco se pudo rescatar los registradores de voz (CVR) y de vuelo (FDR), situación que limita la - evaluación precisa del presente accidente.

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IV.- RECOMENDACIONES

La Comisión Investigadora de Accidentes e Incidentes de Aviación, se permite sugerir:

PRIMERO: Recomendar que toda tripulación afectada al Transporte Aéreo Internacional que opere en zonas cordilleras y en especial en el Aeropuerto Internacional "El Alto", esté debidamente capacitada y habilitada para ese tipo de operación.

SEGUNDO: Recomendar a las Empresas y Operadores Nacionales y Extranjeros que en caso de existir mal tiempo en áreas terminales y en ruta, soliciten información y asesoramiento a las dependencias pertinentes del Servicio de Tránsito Aéreo (ACC La Paz, Santa Cruz), siguiendo las normas y recomendaciones internacionales y conforme a lo publicado en el AIP-Bolivia.

TERCERO: Verificar periódicamente la operabilidad de las ayudas a la navegación aérea de acuerdo a reglamentos en vigencia.

CUARTO: Recomendar la elaboración de una carta de área, (la que complementará las existentes en el AIP-Bolivia), con la inclusión de los obstáculos más prominentes, debidamente señalizados.

Es cuanto informamos a su autoridad, salvando su mejor criterio.

La Paz, 4 de Septiembre de 1985.

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